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Experts Hail Future of Air Cargo at First Special Forum

FORTNIGHTLY REVIEW

Grasshoppers

OR the first time since global warfare doomed civilian rts flying in this country, outlook for the harassed nufacturers of lightplanes is ght. After many months of couraging prospects and the eat of conversion of lightne facilities into the manuturing of parts or subassemes, the lightplane group can , at last, "We're in the war." he Grasshoppers, as the htplanes are now being ed, have won their mark as hicles of war.

he layman would doubtless baffled by a recital of the uffs given to the lightplane far in the war, so obvious its many flexible uses. But brass hats, the Army men cerned primarily with fast nters and heavy bombers, wned on the puddle-jumpers nuisances. But the lightne proponents refused to downhearted, kept plugg away with a single purse, and the fight has been wned with glory.

Belatedly, but not too late, skies are bright once again. ere are still some tough nths ahead, but the production facilities will be kept open; plants won't be converted other uses. That in itself is reat victory.

Two men in particular deve much credit for keeping lightplane in the war effort. e is Irving Taylor, director the war production dertment of the Aeronautical

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Willow Run Now Manufacturing Completed B-24s

Ford-built Consolidated B-24E four-engined bombers are rolling off the assembly line at Henry Ford's Willow Run plant, it was revealed Dec. 4.

Visiting newsmen were told that the huge plant will reach peak production during the final quarter of next year.

Not only have the B-24s started flying away from the airport adjoining the factory, but the company is also shipping completed subassemblies to three southwestern plants for final assembly there, it was said.

Company officials contended that Willow Run is not simply a manufacturing and assembly plant whose output can be ascertained by the number of planes which fly from its airport, since this fly-away delivery will represent only about one-third of the heavy bombers that will result from operation of the plant.

Plane Chief

Charles E. Wilson

Former president of General Electric, who as WPB vice chairman directs scheduling of the entire war production program, with emphasis on aircraft (see story on this page).

Wilson Gets Air Scheduling After Army-WPB Fight

By ROBERT H. WOOD

A JOINT statement Dec. 4 gave WPB Vice Chairman Charles E. Wilson "general supervision" of scheduling the war production programs, set up a production executive committee, an Aircraft Production Board, and resulted in formation of a working committee under the Board which will probably be designated as the Office of Aircraft Production Control.

There was evident in WPB and some industry circles a growing doubt whether the question of military versus civilian control over war programming has been settled.. Full agreement was claimed, however.

Problems which had arisen had to do with method, never with purpose or principle, the War and Navy Departments, WPB and OWI said in

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Speakers Agree on 'Supplemental' Role of Airplane

By ERIC BRAMLEY

FOR the first time in aviation's history, representatives of the Army, Navy, airlines, manufacturers, Department of Commerce, CAA, pick-up operators and glider advocates met in Chicago on Dec. 8-9 for the sole purpose of discussing air cargo, the part it was playing in the war and was likely to play in the post-war period.

The meeting was sponsored by the Chicago section of the Society of Automotive Engineers. The official program called it the "biggest event in the history of the Chicago section."

Never before had such a representative group met to discuss air cargo—an aviation field that has been the subject of super-optimistic speeches, but which has also been kicked around a bit.

A wide range of opinions was expressed at the Chicago gathering. Each speaker had his own ideas and expressed them constructively.

The only point on which almost all speakers were in agreement was: post-war air transportation will not put the railroads and the steamship companies out of business. It

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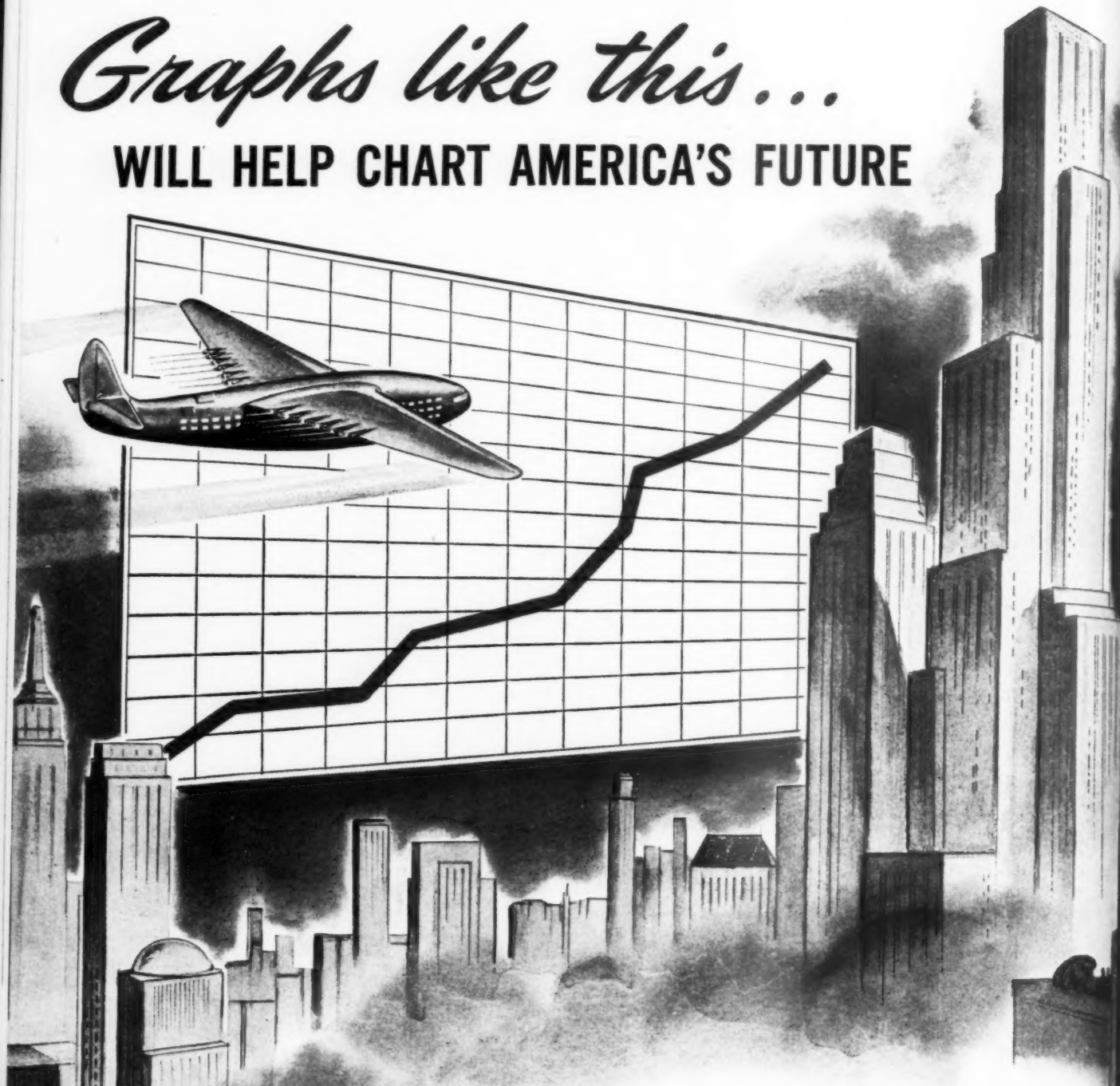
XUM

Graphs like this...

WILL HELP CHART AMERICA'S FUTURE



Behind such graphs as this lies a story. A story of men and machines . . . of planning and working that never stops . . . of meeting and beating production schedules. For on America's War Production depends the future of America—and the World.

Nowhere is that truer than in the aircraft industry. Production quotas have been doubled and redoubled—and increased again. Deliveries of planes by the hundreds have become thousands—and many more thousands are needed.

That's why at McDonnell, we're proud to present this chart. What we make and how much—well, that's a military secret. But it's no secret that our deliveries of aircraft and parts for the Armed Forces have increased many fold as the chart indicates—since December seventh—and we were working three shifts even then.

At present, our entire resources—men, material, machines, research facilities, engineering and designing ability and experience—all are dedicated to one primary objective—to produce the best possible planes and equipment in the least possible time. For the future depends on the present—and our present job is to *deliver the goods.*

McDONNELL AIRCRAFT CORPORATION

SAINT LOUIS

Plane Production Gains Over 100%, With Tonnage Nearly 3 Times 1941

INCE Pearl Harbor the U. S. aircraft industry has pped up production from ap- ximately 19,500 warplanes ear to nearly 49,000, accord- to published figures, or siderably more than a 100% rease, while measured in nage the gain is nearly three es the 1941 record. The 2 output was valued at $4¼ ions.

easured in terms of horsepower, duction of aircraft engines is up t 240%, the Aeronautical Cham- of Commerce reported, while -hours worked in planes, en- s and propellers were up 155%. e Chamber said in the first year ar more aircraft were turned than in all the 23 years follow- the last World War.

e number of plants turning out lanes, engines and propellers has ly doubled, from 59 before l Harbor to more than 100 now, their payrolls have reached an ual rate of a billion and a quar- dollars.

oductive employes building war- es increased about 130%, and Chamber said "peak of employ- t in the industry is nowhere in t," but it estimates that the total ease over the Pearl Harbor fig- will reach 300%.

November productive floor e had increased some 75% over ember of last year, and prospec- expansion will run this up to % in plane, engine and propeller ts.

n the West Coast the Aircraft Production Council revealed raft dollar volume of its eight nbers was up 144% over a year but said that manpower and erial problems cut the rate of ober over September (of this r) to 5.2%. Council members e reached a combined annual duction rate of more than two ion dollars, and daily valuation heir products averages $5,500,000. Council members lost 6,626 trained ployes to the armed forces in tober alone, which was an in- ase of 33% over the previous nth.

Trained men were replaced by killed workers," according to rry Woodhead, president of the uncil. "Man-hours were increased % but production rate increased y 5.2%. Therefore, the dollar ue of assembled airplanes per n-hour worked decreased 3.5%, ersing the previous efficiency nd."

Despite this, the value of assem- d planes per man-hour worked October was 53% higher than the el before Pearl Harbor. Efficiency September rose to the point where man-hour worked in the com- nies' factories produced 59% more assembled airplanes than in November 1941.

In Detroit the Automotive Council for War Production reported that its deliveries since Pearl Harbor of aircraft, fuselage sections, engines, propellers and parts "are equal in dollar volume to 50 squadrons of warplanes, each consisting of 15 heavy bormbers, 30 medium bombers, and 90 fighters." All in all the Council states its daily output of aviation, ordnance, and other products is near $20,000,000 a day.

"All of the former passenger car manufacturers and most of the major parts companies are engaged in the fabrication of airplanes, aircraft engines, or parts thereof. Eleven are making airframe subassemblies. More than a score are manufacturing propellers, turrets and fuselage assemblies. Four hold contracts to produce five types of completed planes, and two of these, nearing the end of tremendous tooling programs, are in preliminary production.

"Aircraft assignments now constitute almost 50% of the automotive industry's cumulative orders."

Lees Joins DSC

Robert E. Lees on Dec. 1 left his position as chief of the aircraft priorities branch of WPB, aircraft production division, to join the Defense Supplies Corp. as assistant to Reed Chambers, DSC vice president. He will coordinate activities of the American Republics Aviation Division and the rubber transport project of DSC.

Pearl Harbor: What happened at Pearl Harbor on Dec. 7, 1941, is graphically illustrated in these pictures. Top photo shows the wreckage-strewn Naval Air Station. In the background, an explosion sends a mass of flames and smoke high into the sky. Lower photo shows one of the 80 Navy planes wrecked by Jap bombs and bullets. The plane was an OS2U Vought-Sikorsky observation scout. The Navy released the pictures on the first anniversary of Pearl Harbor.

FDR Sets 1943 Aircraft Goal, Wright States

The 1943 revised aircraft program has been drawn up in a directive from President Roosevelt, T. P. Wright, chairman of the new Office of Aircraft Production Control, told AMERICAN AVIATION. He confirmed reports that the trend will be toward heavier craft.

Donald Nelson said recently that new facilities for aircraft would be constructed if necessary and Mr. Wright expressed the belief that airframe plants, modification centers and accessories plants would be among any aviation facilities that may prove to be needed.

Although saying there are "tough spots everywhere we look," he said the present program is not badly out of balance as far as bottlenecks are concerned, and that the new one should progress more smoothly.

The U. S. has far more raw material facilities than at this time last year and many production centers are now out of the construction stages ready to take their place in the program, he said.

The aircraft industry will take on "two or three times as heavy a load as far as output is concerned," Mr. Wright said, referring to 1943. He is convinced the new scheduling procedure will bring WPB, Army and Navy closer, resulting in a great spur in final results.

Asked to comment on the industry's greatest problems in the year ahead, Mr. Wright said materials and manpower will prove the most difficult obstacles.

The sooner the public forgets numbers of units in plane production, Mr. Wright feels, the sooner they will have an understanding of the program. Weight counts now, and it's hardly fair to lump a four-engined bomber and a "puddle jumper" together on an equal basis.

British Air Plants Impress T. P. Wright

T. P. Wright, Deputy Director of WPB's Aircraft Production Division, has returned to Washington following an inspection tour of Great Britain's aircraft and aviation manufacturing plants.

He reports that he was impressed with the ingenuity of the British in locating and constructing entire factories which are entirely underground or hidden in hillsides. Other plants, using the dispersal system to prevent any single bombing attack from putting a stop to all operations, are scattered in as many as 40 or 50 small shops. "Obviously", he said, "this does not make for efficiency."

Wright said he believes the Rolls Royce Merlin is probably the greatest fighter engine in the world.

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Axis Air Power Weakens, Officials Agre

United Nations' Plane Strength Grows Daily

ALTHOUGH furious fighting is still ahead for Allied air forces on all fronts, the outstanding development of the past few weeks is the unmistakable weakening of Axis air power, in contrast to the rapidly growing strength of the United Nations.

As the Germans rushed all possible aerial reinforcements to the Tunisian area, using fleets of Junkers sky-trucks as well as bombers, dive bombers and fighters, there was noticeable slackening of air activity over other German territory.

The Japanese, too, have fewer planes in the air and less-expert pilots to fly them, according to high officials in Washington and military personnel in the field.

Sir Archibald Sinclair, British Air Minister, stated that the second front in North Africa had already forced Hitler to divert a fifth of the air force he used against the Russians.

"This Axis air strength has been moved to the west and south, where the RAF and the U. S. air forces were already engaging half of the German and all the Italian air forces on the European and African theaters," he revealed. This statement received little publicity in the press. It was released in Washington by British Information Services a day after it was made in London.

BIS said, as is the case elsewhere, enemy planes in Europe are inferior in quality.

'Great Air Battle'

"The air fighting which is now taking place (in North Africa) is on a small scale with what is likely to happen when Gen. Eisenhower's air strength is fully built up," Brig. Gen. H. S. Sewell, war commentator for BIS, asserted. "A great air battle is likely to be fought before any big ground operations in Tunisia can be undertaken, and this battle has only just started." All signs pointed to rapidly stepped up air activity over Tunisia as this story was written Dec. 7.

Prime Minister Winston Churchill made the bold statement that "Already the German air force is a wasting asset. Their new construction is not keeping pace with losses. Their front line is weakening both in number and, on the whole, in quality.

British, American and Russian air forces are already together far larger and are growing steadily. British and U. S. expansion in 1943 will be, to put it mildly, well worth watching. All we need is more frequent opportunities for contact."

Meanwhile, Raymond Daniell, London correspondent for the *New York Times*, cited estimates "from the best available authority" that Hitler now has about 5,000 first-line combat planes. Of these 2,000 have been on the Russian front, which has exacted such heavy toll that it has taken the best part of Germany's monthly production of 1,400 combat planes to maintain reserves. Of these 2,000, nearly half were bomberes.

350 in Norway

In Norway Germany has had about 350 aircraft, Daniell said, while along the English Channel the Goering fleet has averaged 250 bombers and 550 fighters. In the Ruhr and Northwest Germany there are some 300 night fighters, and first reports from North Africa indicated about 1,000 German planes based within striking distance.

"For the task ahead of it, the Nazi air force would have to use twice or three times the number of planes at its disposal, but all the time the margin of its inferiority compared with the United Nations air strength is destined to grow."

Official communiques and press statements revealed that in the Pacific theater Japanese air power also has been diminishing, while the U. S. Army Air Forces sent powerful reinforcements to air bases in China and India. Fighter opposition was strangely lacking in the Solomons and New Guinea areas. The Japs recently transferred 300 planes to Indo-China, about 900 miles from growing U. S. air bases in Kwangsi and Yunnan Provinces, to meet the allied threat.

Japs Deteriorate

Japanese pilots being thrown into the Southwest Pacific battles have shown "marked deterioration" and lack aggressiveness, Col. John H. Davies, who commanded a squadron of U. S. attack bombers and dive-bombers, reported upon his return to Washington.

Other Washington officers said some Jap flyers recently taken prisoner had left Tokyo only a few days earlier. New evidence points to Japanese air training courses "longer by years" than those in the U. S.

Meanwhile, as Lieut. Gen. George Kenney's forces concentrated on blasting the Japs from the Buna-Gona area of New Guinea, a *New York Times* correspondent expressed the opinion that "Rarely has an air force had a more vital role to play. . . . The outcome of the effort to retake the area may depend on the air force's ability to continue to smash Jap naval efforts to support their troops."

What the U. S. public thought of the potentialities of air power during the first year of war was summarized by Dr. George Gallup Dec. 6, making clear once again that the government's plans for concentration on aircraft production in 1943 has the full support of the nation.

Favor Air Power

"Possibly the most outstanding military opinion of the majority of American people is their belief that air power will be by far the most important element in winning the war," he said. "Today, public faith in air power is such that more than two-thirds of the people rate it as more important to victory than land or sea power. . . . A majority would like to see a separate air force with rank equal to the Army and Navy, and would favor aviation training for boys in high schools to help insure the future efficiency of our air fighting force."

Hanson W. Baldwin, war analyst for the *New York Times*, Annapolis graduate and staunch supporter of the battleship, in general took slighting notice of air power during the fortnight, making clear that in the Tunisian sector "neither side seems to have introduced any startling new types in the air battles, although the Lockheed (P-38) seems to be getting its first real baptism of fire . . . at the same time it is receiving its first major combat operational tests in New Guinea-Solomons area.

"On the long road to victory that lies ahead it is unlikely that we can depend upon air bombardment alone. The massive air raids upon Germany, Italy and German-con territory have had effect—par effect upon morale and som less upon industrial productio communications. But the four raids have been emphasized by infrequency. . . ."

Despite this criticism of hor bombing, Baldwin failed to ta tice of the new techniques re late in November when Fortresses began bombing Jap ping from lower altitudes tha before in combat history and results. Using this method

Higher Mathematics!

sank a Jap cruiser and four destroyers off New Guinea. men have held high-altitude ers up to scorn claiming th curate bombing from 30,000 f moving ships is impossible identification of targets from a distance is likewise largely work.

"Our heavy bombers are tod erating at lower altitudes than before and they are getting with every bomb dropped," Kenney said. Heavy and m bombers are protected upstai fighters while such attacks progress, Kenney revealed.

One of his aides added: "If had said five years ago th would be operating from belo 000-ft. and strafing warships ground targets from 50-ft., have claimed they were crazy

Air Commodore Henry N. T ton, British Air Attache to t S., was willing to compens writers like Mr. Baldwin, h and authorized newsmen to him that the RAF and AA power deserve "a major por the credit" for routing R forces in Egypt. The Libyan tion was seen by Thornton as example of air superiority.

R. H. W.

British Press Service

Air Power: This unusual photo shows a large number of RAF four-engined Lancasters sweeping across a French town on their way to Le Creusot, France, for a low-level attack on the Schneider works. The British state that there were 48 Lancasters in the flight. Can you count them?

rmy Hails Mustang and Lightning; U. S. Planes Strike on all Fronts

INGLING out three of the scores of Army-type aircraft now in action throughout world for special praise, War Dept. in official press eases gave publicity to a orld War flyer who sees the rth American Mustang as outstanding fighter of the ming year, a general who ls the Lockheed P-38 "inuable," and an AAF comander back from the Pacific o lauds the Douglas A-20 mber.

Current opinion in England ng both American and English rs is that the P-51 Mustang with Merlin engine will be the best ter plane for 1943," the Departnt quoted Maj. Thomas Hitch-, World War pilot, former direcof American Export, and former star.

viation observers attached special ificance to the emphasis on the ish Rolls Royce Merlin engine he announcement.

'Pilot's Airplane'

t's best described as a 'pilot's lane,'" said the former member the Lafayette Escadrille, who the Mustang before he left land to complete a seven-months

t's very fast and handles beautily at high speeds . . . A well eloped instinct of self-preservain the British people, plus the ls Royce engine, will assure the lish a place in the front rank of ter planes for the next few years, le the resources of the U. S. and engineering skill which has deped the laminar flow wing used the P-51 will assure American rs of fighter planes worthy of ir skill," he said. He emphasized that quality is more important than quantity.

Brig. Gen. William Butler, of the AAF, has described the performance of the Lockheed Lightning in the Alaskan theater in these glowing words:

'Versatile and Useful'

"The work of the P-38 has been invaluable in this theater, and continues to be so. We cannot praise it too highly. Due to its very high speed at all altitudes, its ability to operate from small, rough fields, and its excellence in ground strafing and combat, it has proven itself the most versatile and useful plane in the Alaskan theater. It can carry a heavy load of bombs or it can accompany bombers several hundred miles. Because of its firepower forward and its speed, it is the ideal plane for deck level attacks. When damaged, it has returned on one motor without difficulty."

Butler's words were quoted by Lieut. Gen. Joseph T. McNarney, Deputy Chief of Staff, in an address Dec. 6. Performance of the B-17s and B-24s were also mentioned by McNarney, who revealed that the Lightning "does better than 400 mph., and its cannon can blast a bomber in the air or a tank on the ground from a mile away." It is in action in Africa, Southwest Pacific, and the Aleutians.

Col. John H. Davies, just back from service in the Pacific theater, and action earlier in the Philippines, praised the "toughness and efficiency of American planes," especially the Douglas A-20. "Most of the types in use in the Southwest Pacific theater have given excellent account of themselves," but he urged new types of dive bombers with greater speed and range.

Likes A-20

Davies, who commanded A-20 units, said the planes as equipped to meet special conditions of the area are doing "a wonderful job." They are being used particularly to knock out enemy airplanes on the grounds, and ground troops and installations. They have done more damage to grounded Jap planes at Lae and Salamaua than have bombing raids, he said.

Meanwhile, communiques the past fortnight told how U. S. built aircraft were striking at the Axis on all fronts.

Dispatches from Tunisian North Africa revealed that the Lockheed P-38 "got its first big chance" in that zone against the enemy late in November by downing 40 Axis planes (14 in one day), including 11 big Junkers troop transports. Maj. Gen. James Doolittle pronounced the P-38 "one of the sweetest flying planes in the air." The Lightnings also have been working at groundstrafing and tank-busting, as well as escorting Boeing B-17s, communiques and press dispatches during the past fortnight revealed.

Also working in the Tunisian area with the AAF's 12th Air Force are Curtiss P-40s, aided by planes of the British Fleet Air Arm and RAF. Medium bombers operating with the AAF had not been identified officially up to Dec. 8 but there was general belief in Washington that Martin B-26s and North American B-25 Mitchells were on hand. Gen. Doolittle was concentrating attention on the B-26s' characteristics before he left the U. S., it was stated.

The rapidly-growing Air Force in China reported using Curtiss P-40s and Mitchells, both of which attacked Canton and other Jap bases. They are being aided by RAF Blenheim bombers in sweeps over Southern Burma.

Operating in the Guadalcanal and New Guinea sectors, according to communiques, are Douglas A-20s, Boeing Fortresses, Mitchells, Martin B-26s, Lockheed Hudsons, Bell Airacobras, the ever-present P-40s, and the Navy's Consolidated PBY's, Douglas Dauntless, Grumman Avenger and Grumman Wildcat.

Channel Raids

Active in channel raids into France and the Netherlands, from Britain, were AAF B-17s and Consolidated B-24s, plus British and Canadian-flown Mustangs and Douglas Bostons. Lockheed Hudsons were aiding the British Command damaging Dutch shipping, and the Mustangs were serving with the Army Co-operation Command.

The U. S. Ninth Air Force in Egypt reported active use of American-built aircraft by both French and U. S. Pilots. American pilots took B-24s on America's first attack on Italy Dec. 5, hitting shipping, fleet units, and other objectives at Naples. Both U. S. and RAF B-24s also made frequent attacks in the Western Desert, including Tripoli. U. S. Liberators blasted Leros Island in the Dodecanese Group.

"Honey, don't be so angry with me. I can teach you a lot of things if you are only willing to learn"
Pearl Harbor
Wash. D.C.
Singapore
Command
Politics

Washington Times-Herald

New York Herald Tribune

Harass Rommel: A formation of 18 Douglas Boston bombers takes off to aid in the destruction of Rommel's Afrika Korps.

The 10th Air Force announced use of heavy bombers, probably Fortresses, from New Delhi, India, to Jap objectives in Rangoon, the Andaman Islands, and shipping. RAF planes are also based near New Delhi.

U. S. Army Flying Fortresses and unnamed fighters, probably based in the Andreanof Islands in the Aleutian Group, attacked Attu Island and nearby Jap shipping, without loss.

A Russian air force regiment has been flying North American B-25s for seven months, a special cable to the *New York Times* revealed Nov. 29.

R. H. W.

Fights at 50,000 Feet

The British Air Ministry has reported that a Spitfire fighter recently attained altitude of nearly 50,000 ft., more than nine miles, to shoot down one of a number of specially equipped German Junkers 86 long-range reconnaissance aircraft which had been fitted with two powerful engines and an enormous wingspan to get above the ceiling of any existing fighter.

The feat was accomplished over the western desert. Actually more than one Spitfire was specially adjusted and fitted with pressurized cabins. The pilot, George Reynolds, reported 67 degrees below zero, with the cockpit and instruments covered with ice, his arms paralyzed and he said he suffered nausea. He said he saw the entire Aegean Sea, Bengasi to his right, the length of Palestine, and the Suez Canal to the Red Sea.

Spaatz to Africa

Maj. Gen. Carl Spaatz, Commanding General of the AAF in the European theater, has assumed direct command of European-African air operations, although his position was described as chief air adviser to Lieut. Gen. Dwight D. Eisenhower. It was understood that Maj. Gen. Ira Eaker, commander of the American Bomber Command in the European Theater, would succeed Spaatz in London and that Brig. Gen. Newton Longfellow would take over the Bomber Command. Maj. Gen. Doolittle remains in command of the 12th Air Force in Africa.

British Government Mum on Post-War Air Policy, as Plane Firms Wonder

(By a British Correspondent)

Edinburgh, Nov. 27 (Air Mail)

Any writer, however expert, who promises accurate information about British plans for civilian aviation development after the war can be counted out as a liar.

We just do not know where we stand. No doubt men in the confidenee to top government officials do know, and no doubt manufacturers have some plans, but there has been no detailed statement despite attempts to draw the Government into a committed policy.

The importance of the position need not, of course, be stressed to American manufacturers, since only the British Empire is in the position of being a rival for this vast new field of enterprise post war. If it were known what Britain proposed, American companies could lay plans. Perhaps that is why Britain keeps mum. For however much we may be allies we are, commercially to some extent, rivals.

Several statements point to British intention to take part in post war production of civilian aircraft on a large scale.

Lord Inverclyde, industrialist, said recently that "Clydebuilt" has been the hallmark of shipbuilding for generations, and he believed the time near when it would imply an equally accurate and efficient standard of commercial aircraft, with the west of Scotland leading the world in plane building just as it has been a world shipbuilding center. He visualized development of vast trans-oceanic flights which would bring the Empire within a few hours or days of London.

Add to that the fact that it has been disclosed that Scottish builders of aircraft are known to have definite plans.

Shipbuilders throughout Scotland are working on the possibility of converting their plants and fitting-out basins to mass production of giant aircraft rather on the lines advocated in the U. S. by Mr. Kaiser. They are vitally interested in alternative modes of transport and will certainly not hang back if they can control both the sea and air construction yards.

Now for England: Here we have had vast shadow factories built to produce bombers which, with some adaptation to plant, could turn out air carriers. There are also now vast reserves of skilled men and women builders, just as, to a lesser extent there are in Scotland. All of the requirements for creation of a building industry exist.

Gordon England, one of our experts, told the Institute of Export that he wants a fleet of 5,000 cargo aircraft operating from Britain postwar to meet the needs of British trade and communications with the Colonies and the Empire Dominions overseas. That demand found an immediate response all over Britain and newspaper and other commentary regard it as the most vital declaration yet made.

Alfred Instone, vice chairman of S. Instone & Co. Ltd., a colliery and shipping combine magnate, has also recently commented on the proposal that air transport should be increased and states that he and his brother early in the war advanced this plan themselves to the British Government—that not only would construction of an air carrier fleet prove invaluable in replacing sea losses but that it would offer post war an air mercantile fleet ready for use on overseas trade routes. It must be watched, this expert stated, that the post war value of a war time air fleet is not overlooked.

Given men and material, Mr. Instone states there is no reason why Britain cannot build aircraft bigger and more powerful than anything yet seen and he ventures the belief that British aircraft designers and producers would welcome the chance to show what they can do.

These viewpoints by leaders in concerns of great magnitude demonstrate very clearly the view of the industrialist. British industries are straining at the leash to get at the carrier aircraft sphere just as they did in shipping in the last century and make no mistake, the brains, enterprise and guts which built up our mercantile marine are still available. What then is lacking?

The answer is simple. Government policy is unknown, and no direct answer has been given to any effort to draw the fire of the Big Shots. Press enticement and Parliamentary questions have failed to elicit the charmed words which would show our people where they are. That may be intentional or otherwise. One fear in the minds of our industrialists who are already in the aircraft game is that the Government plans a monopoly, such as the Post Office and radio are already.

This writer believes the British Government has a monopoly in view, or at least a subsidized sponsored service.

There have been suggestions here that the development of air carriers (airliners) is being left to the U. S. A. and that Britain is working on fighters and bombers by arrangements between the two countries but any specific admission to that effect is not evident, despite attempts of many critics here to discover what is the true position. (Britain has received a number of DC-3 type transports for the RAF recently.)

It can be said, however, that there is considerable suspicion here of the British Government on this score. One critic pointed out that any such arrangement would permit the U. S. A. to create not only a fleet of carriers for postwar use but a staff, skilled in the maintenance and operation of such carriers, an invaluable aspect of postwar development which is not lost on our people here who are watching the British actions as closely as U. S. manufacturers.

"Unless some radical change of British policy is rapidly forthcoming, we shall have to start from scratch," one British organ said. "The effect on our ability to compete in aerial freight markets will be considerable but not less prejudicial may be the curb on British technicians and aircraft constructors."

Whatever may be the position, it is positive commercial interests here will force development of the carrier plane, that they will press for private ownership and management, but that they may be defeated and a state-owned or sponsored system will develop. The feeling is also positive that the Government will not be so foolish as to ignore value of such a fleet, especially the conquest of North Africa haps we are most dangerous we are silent and that may postwar development of transport.

• • •

Sir Stafford Cripps, former bassador to Russia, special to India, prominent Socialist Deputy Prime Minister, has cepted the post of Aircraft Production Minister, at request of Churchill. Great men are not in this war unless the occasion mands. It means a definite ment in policy and an intensi of the use of the air arm as a pon of war. For the meantime new man is at the helm and is getting hotter daily in production here.

British Press Service.

Improved Spitfire: An improved version of the Spitfire, equipped with a four-bladed propeller and two radiators under the wings is now in service with the RAF, according to British sources. The new model has a Rolls Royce Merlin 61 engine instead of Merlin 45 or 46. Armament consists of two cannon and four machine guns housed in the wings.

Lyttleton Denies U. S. and Brit Divvy Up Ty

Oliver Lyttleton, British M of Production, in a press conf in Washington No. 30, nailed sistent press reports that Gre tain would concentrate on pr tion of fighters while the U. S. step up heavy-plane manufac and taper off lighter models.

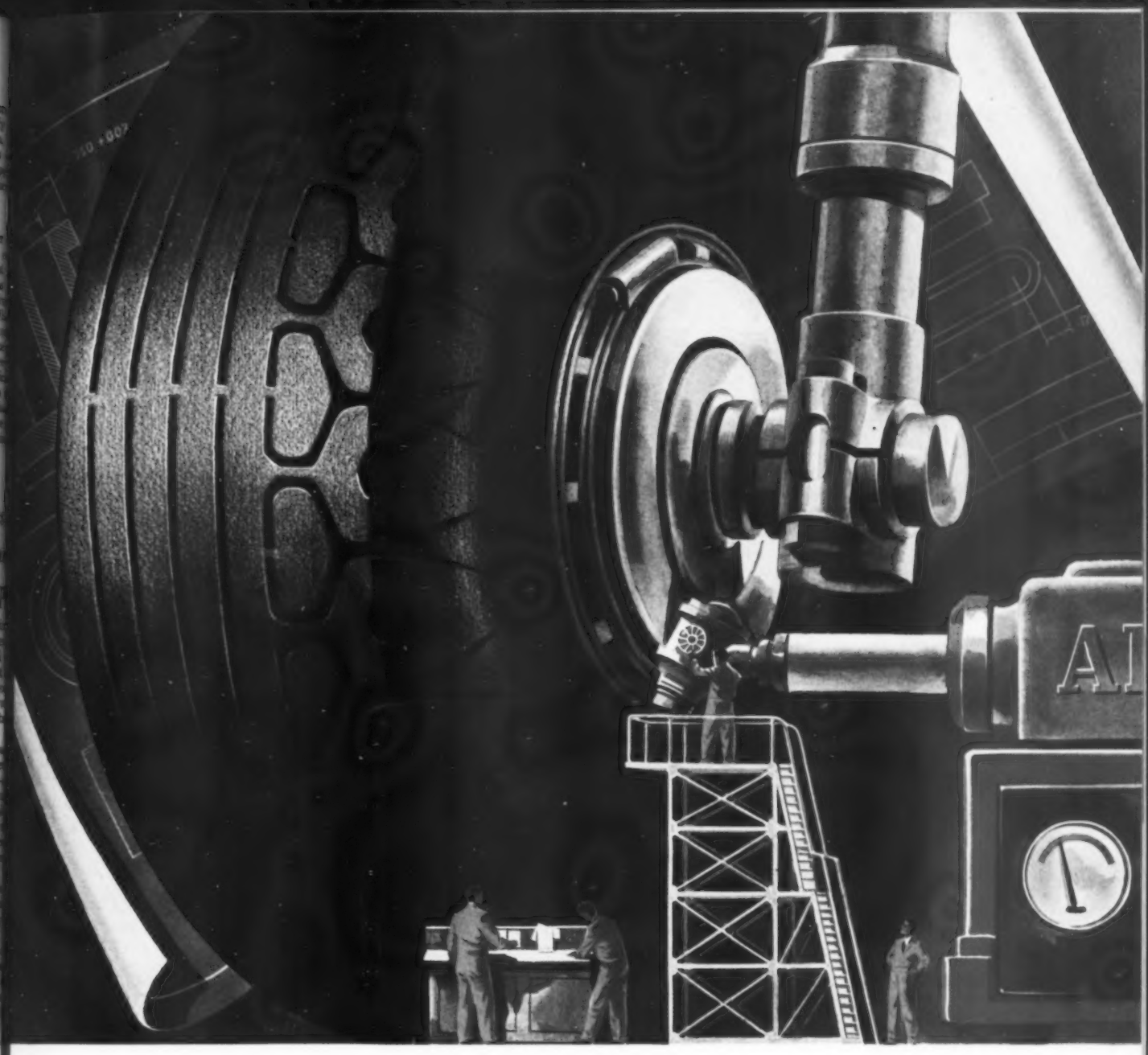
Industry spokesmen have to point out to newsmen for weeks that any such large transformation would req months of work in plants production at a time when effort is being exerted to the flow of planes to the battle fronts.

Lyttleton, answering a questi a reporter for AMERICAN Av revealed that he was probabl source of the rumors which cropped up months ago shortly he presented a hypothetical reporters in an attempt to show the two countries could, if tions made it feasible, tie in production programs.

Although denying large-scale lotment of specific types for the countries' plants, he said a c type of fighter will be made of components, assembled in Eng and there be equipped wi British-built engine. He favors ment for a marginal 10% of the countries' new production, ever, such as 5% earmarked fighters to be built in England 5% to bombers to be produced

At this time, with the war pi fairly well fitted into place, Britisher said it was "perf feasible" to settle the nature pattern of production for 1943.

In Washington it was consid significant that the only membe the armed forces to accomp Lyttleton to the main confer with President Roosevelt was L Gen. H. H. Arnold, AAF chief mediately after the conference, L tleton admitted major changes production schedules had b planned and that Britain will crease its aircraft production 1943, although other officials h contended that Britain is now ducing at near-capacity.



Free Air FOR A FLYING FREIGHTER?

It is safe to say that the landing gear of the coming sky freighters won't look like this enlarged version of today's equipment.

However, regardless of what it looks like, the problems of tomorrow's landing gear and related devices are of material interest to the Aviation Division of Whiting Corporation. Whiting's Collateral Engineering Service is available to collaborate with the aircraft designer on the related problems of maintenance and handling . . . and have new equipment ready when the new planes need it. Write for information on this service.

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AVIATION DIVISION

XUM

DOUGLAS "Dauntless" Dive Bombers are blasting the Enemy out of the sea. These airplanes and other American bombers and torpedo planes are striking with telling accuracy at carriers and battleships that stand in the way of Victory.

Bendix Aviation, Limited, Hydraulic equipment and accessories also ride aboard these planes. This is our part of the Invisible Crew that is in service wherever America has met the Enemy.

Bendix Aviation Ltd. North Hollywood

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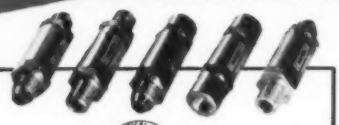

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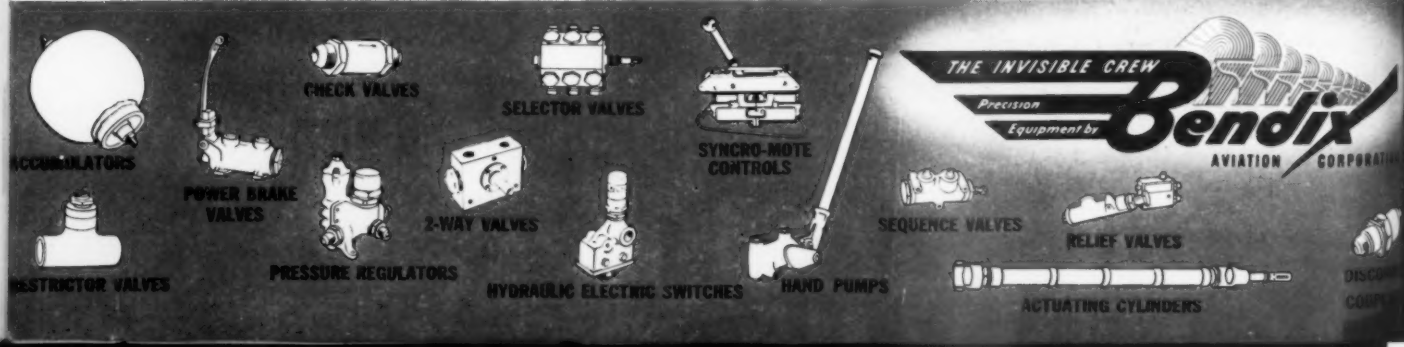
Bendix Aviation, Limited, Hydraulic check valves have virtually become the standard of the industry...in service on the majority of U. S. fighting planes today...and engineered into our planes of tomorrow.

They are extremely simple in design and give positive performance over an exceptionally long service life. These valves utilize the exclusive Bendix plastic poppet which requires no inserted seat and wears in—instead of wearing out.

Bendix check valves are designed for production as well as performance—they are being produced *today* at the rate of over **CENSORED** thousand a month—and Bendix has the facilities to accept additional production commitments.



Navy Again Turns Down Flying Boats; Cancels Nash Order for Cargo Planes

FOR the third time in recent months the Navy has turned down projects for production of huge flying boats, in furtherance of its program for procurement of as many landplanes as it can acquire.

Nash-Kelvinator Corp. Nov. announced cancelation by the Navy of its contract for scores of Vought-Sikorsky four-engined cargo boats, after the new plant at New Orleans was in an advanced stage.

Last August the Navy took delivery on the prototype of Boeing Aircraft Co.'s newest boat, the twin-engined Sea Ranger, then ordered the new plant remodeled to turn out "long-range landplane types to meet more urgent requirements." It also announced the Martin Mars would not go into production.

The quick revision of the Navy's requirements "in view of developments in the Pacific" was given as the reason for the Nash change, according to reports following the action of Rear Admiral E. M. Pace, Jr., director of the Navy's Materials Division.

Affects 'Feeders'

"Increased production of combat planes and fast patrol bombers is needed immediately," Pace said, and that means that some of the facilities available through Nash-Kelvinator for flying boat production will have to be turned over to contractors who are already at work on the types of planes we now need in order that they may expand their output." The New Orleans plant will be made available to a large aircraft manufacturer, the official statement said. Cancelation will affect "feeder" plants operated by Nash in Wisconsin and Michigan.

The Vought-Sikorsky VS-44A, an earlier model of the ship Nash was to build, is now being operated by American Export Airlines on transatlantic passenger and express service. One of Export's three craft was in an accident at Botwood, Newfoundland, Oct. 3.

Mars is 'Orphan'

Another flying boat ordered by the Navy is also an "orphan", the Martin Mars, largest flying boat in the world, production of which will not be started. The prototype is being converted to cargo accommodation. Denying an assertion by Maj. Al Williams, writing in the Scripps-Howard newspapers, that the Mars is "obsolete as far as performance is concerned," Glenn L. Martin, president of the company bearing the name, replied in the past fortnight:

"The Mars type of flying vessel is not obsolete and has not been pronounced so in official circles. It is the most efficient long-range aircraft ever built. It can carry a greater useful load than any airplane extant because it can carry more weight per horsepower or per pound of strategic material than any other aircraft. It is a proven design. Its performance has been highly satisfactory.

"When the Mars type was designed for the Navy it was intended to perform either as transoceanic air cargo and transport service or as ultra-long-range bombardment, or both.

"The prototype ship was built as a patrol bomber. But at its completion, by Navy direction, it lacked certain items of armament and protection that tactical airplanes must have under present warfare conditions. Therefore, it is being converted at the Navy's request into a badly needed cargo airplane and the Navy has ordered for it the latest and most modern engines in the world.

Ready to Produce

"Important point is that except for minor modifications the type is completely engineered and ready for production. In future there will be other, greater transport airplanes, but new designs consume an enormous amount of time for engineering and experimentation and in this war time is of the essence.

"Unfortunately, it is not proper to disclose comparative performance figures and capabilities. But in the final analysis, facts support the contention that the type is the most efficient of all long-range cargo airplanes and also the most efficient of long-range bombers."

Latin American School

A meteorological training program for citizens of the other American republics, "for training in the most modern methods of meteorological observation at a school established at the university center of Medellin, Columbia," has been inaugurated by the Office of the Coordinator of Inter-American Affairs, according to announcement. Course will last for six months. U. S. Weather Bureau is interested in the possibility that "information concerning the distribution of southern hemisphere air masses will improve weather forecasting in the United States and Panama," and hopes to see this science developed in Latin America.

Army-Navy Bulletins

Christmas Mail: War Dept. reports 14,443,080 air mail letters were sent through the Army Postal Service from Oct. 1-Nov. 15, and that the "major part . . . already has arrived overseas." New York division of Army Postal had the heaviest shipments, with 74,646 lbs. of air mail, totaling 5,225,220 pieces. Through San Francisco, 44,087 lbs. of air mail, or 3,086,090 pieces, were shipped overseas.

Army Seminar: A seminar for government plant inspectors, covering plant protection engineering and lasting three weeks, started Nov. 16 at the Illinois Institute of Technology, Chicago, Ill., under auspices of the Internal Security Division, Office of the Provost Marshal General, War Dept. Forty Army officers and civilian inspectors are enrolled. It is planned to conduct similar seminars every three weeks at various colleges and universities, with one which was scheduled to start about Dec. 1 at New York University.

Officer Courtesies: Warrant Officers and Flight Officers are now entitled to the salute and other courtesies of the service normally granted commissioned officers, War Dept. announced Nov. 25. Chief Warrant Officers, Warrant Officers, j. g., and Flight Officers rank immediately below Second Lieutenants and above all other grades.

Wasp, Langley Again: USS Oriskany, now under construction, will be renamed *Wasp*, the aircraft carrier lost near the Solomon Islands Sept. 15, which will bring to eight the number of vessels successively named, according to the Navy Dept. *USS Langley*, the Navy's first aircraft carrier, later converted to a seaplane tender and sunk in the Java Sea last winter, will be the name of a new carrier now being constructed in New Jersey.

Add Production Awards: Included in industrial plants selected to receive the Army-Navy Production Award, are: The American Brass Co., and the Buffalo Forge Co., Navy Dept. announces.

Add Construction: War Dept. announced Nov. 21 authorizations for expansion of AAF installation at Pampa, Texas, to cost in excess of $1,000,000, and for construction of AAF installation in connection with Camp Hulen, Palacios, Texas, also to cost in excess of $1,000,000.

Assignments Revised: Secretary Stimson has directed that prompt adjustments be made in reassigning young officers from administrative work in Washington to field duty. He is understood to have specified that two thirds of officers in that group must be over 36. It is intended that men should be sent out of Washington with the least possible disturbance to coordination and replacements.

49,000 Planes This Year

Office of War Information reported Dec. 6 that the 1942 output of aircraft will total approximately 49,000, comparing with opinions expressed in the industry that the figure will be at least 47,000.

The report estimated this year's production of tanks and self-propelled artillery at 32,000 with 17,000 anti-aircraft guns larger than 20mm and 8,200,000 tons of merchant shipping.

"While we have reached the goal in merchant shipping, we have fallen behind in other categories," OWI stated. "Yet, there are compensating factors. An increasing proportion of our planes are heavy bombers."

Thunderbolts Dive At 725 mph

Two Army lieutenants in Republic P-47 Thunderbolts on Nov. 15 dived their planes at 725 mph, and "probably became the first human beings to hurtle through space at a speed greater than that of sound," Republic Aviation Corp. announced Dec. 1.

Although the speed of sound is 736 mph at sea level, it decreases as the density of the air decreases. The dives took place between 36,500 ft. and 25,000 ft.

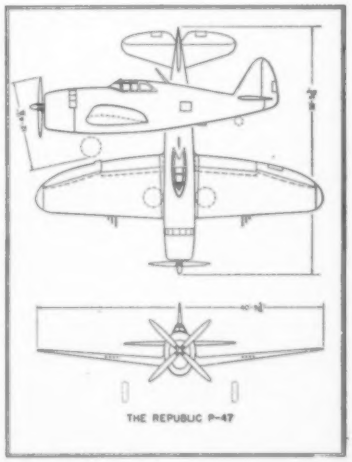
The two Army flyers, Lieutenants

Republic P-47

It Dove at 725 mph

Harold Comstock and Roger Dyar, had no intention of making the dives when they took off on Nov. 15. Each was to do horizontal speed runs at 35,000, 30,000 and 25,000 ft. When they completed their work at 35,000 or thereabouts, they dived merely to reach more quickly their next level of operations, the company explained.

Attaining a speed of 725 mph, the pilots found that control surfaces were "straightened out" with such tremendous force that they were unable to use the joy sticks. However, the pilots "were at the plane's best fighting altitude, and when physical laws prevented use of the stick, both pilots resorted to the crank which controls the elevator trim tabs," according to Republic.



Three Views: This is the first three-view drawing of the Republic P-47 Thunderbolt that has been made available for publication.

Wilson Gets Air Scheduling

(Continued from page 1)

their announcement. The disagreement, which was mainly between Donald Nelson and the office of Under Secretary Patterson of the War Department, culminated in two special trips to the White House by Mr. Nelson, the second time accompanying Mr. Wilson, who was on the point of resigning.

Although the policy affected all war manufacturing, the squabble centered around Wilson's powers to schedule aircraft. The Navy apparently did not object to Wilson's plane rights but the War Department held up its approval for more than two weeks.

A second statement, attributed to Donald Nelson, said:

"Mr. Wilson will exercise general supervision of the scheduling of the programs between the various services to see that they do not conflict, and that they are of such a nature that they may be performed in accordance with the requirements of the Joint Chiefs of Staff and of the total war program.

"In carrying out these duties, Mr.

Pace Meyers

Wilson will have the advice and assistance of the Production Executive Committee." This Committee includes, in addition to Mr. Wilson, the following members:

Lieut. Gen. Brehon B. Somervell, Commanding General, Services of Supply; Vice Admiral S. M. Robinson, Director of Procurement & Material, Navy Dept.; Maj. Gen. Oliver P. Echols, Commanding General of the AAF Materiel Command; Rear Admiral R. A. Davison, Assistant Chief of the Navy's Bureau of Aeronautics; Rear Admiral Howard L. Vickery, Vice Chairman of the Maritime Commission; and Ferdinand Eberstadt, Program Vice Chairman of WPB.

"In addition to these duties, Mr. Wilson is charged with the particular duty of central supervision and direction of the production programs of aircraft, radio and detection equipment and escort vessels," it was said. "He will exercise these duties through the supply and procurement branches of the services.

"In the case of the aircraft program, Mr. Wilson will have the advice and assistance of the special Aircraft Production Board.

"The members of this board, in addition to Mr. Wilson, are: Lieut. Gen. William Knudsen, of the Army; Maj. Gen. Echols, of the AAF; Rear Admiral R. A. Davison, and T. P. Wright, of WPB.

Davison Wright Knudsen Echols

"While Mr. Wilson has authority to inquire into any feature of the war production program and to consult on production matters with officials of the services or any producer, he will issue his directions through the supply services of the Army, the Navy, and the Maritime Commission," the statement concluded.

Those who expect Mr. Wilson to meet further opposition from the War Department believe the official statement lacks decisiveness in setting forth his powers, contend that the statement is ambiguous and can be interpreted to mean whatever the Services decide they want it to mean. Furthermore, it is pointed out, the actual scheduling will be performed by the Services, presumably at Mr. Wilson's direction.

Talbott Not Named

The new procedure will supplant the WPB's Aircraft Production Division, which has functioned under H. E. Talbott as director. Talbott was not named on the membership of either the Aircraft Production Board or its working committee, and reports in Washington said he will resign. The Division has always worked well with the aircraft industry and criticism which has been attached to many WPB industry divisions has never been a part of the aviation staff. Complaints of aircraft and other aviation manufacturers have been leveled at other WPB divisions.

T. P. Wright, who has been Deputy director of the Division, will be chairman of the group which will work with the Aircraft Production Board, tentatively titled the Office of Aircraft Production Control. Members will be Rear Admiral E. M. Pace, Jr., Director of Materiel for the Bureau of Aeronautics; Maj. Gen. Bennett Meyers, Jr., Chief of Staff of the AAF Materiel Command.

Knudsen on Board

Army sources indicated that Under-Secretary Patterson was instrumental in placing Knudsen on the big Board and that Army aircraft procurement and production will be done through Knudsen, who is in Patterson's office.

Although the staffs of Wilson and Wright will probably remain in present WPB quarters, the majority of the present Aircraft Division are expected to move to the War Department's Pentagon Building in Virginia to be commissioned, or resign and return to business life. WPB officials doubted if more than a fourth of the Division's personnel will go over to the War Department which will mean confusion as a new group takes over the paper work.

The Army's Wright Field unit, which has been criticized for making errors in scheduling in the past year, with a lack of coordination for maximum production of aircraft, will continue to function, AMERICAN AVIATION was told by T. P. Wright.

"WPB's responsibilities for supervising and insuring the success of the overall war program will be executed to key all schedules to the capacity of the country, making sure that production can be maintained smoothly, and allocating the country's raw materials producers accordingly," one WPB spokesman said.

2 Categories

To accomplish these ends, WPB's operating functions will fall into two principal categories: (1) Supervision over programming and scheduling, under Vice Chairman Wilson, and (2) Handling the flow of materials, under Vice Chairman Eberstadt.

As explained by one official, the various programs will be sent to Mr. Nelson by the Services and the Maritime Commission who will forward them to Wilson to decide whether each can be executed. Wilson will, with the aid of his Production Executive Committee, check with Eberstadt to learn whether the stated material requirements are correct and to determine how the programs line up with available materials. If any program is found impracticable it may be sent back to the Services or the Joint Chiefs of Staff for revisions. If approved, however, the programs become the basis on which contracts will be let and allotments of materials made, and to which the production schedules of separate items and components are adjusted.

The approved programs then reach Eberstadt, primarily in the form of demands for materials, and he "flows" these required materials into the production channels of industry so the programs can be met.

Passing on the over-all programs, however, is only part of the job. Any such program means thousands of factory production schedules, each setting delivery dates at factories.

Mr. Wilson is responsible for these schedules, seeing that they fit together, and for this reason he has been given control over the Office of Program Progress of WPB. Through this office, and through others who will work directly with the Services, he will receive up-to-date progress data to check phases needing his personal attention, and will consult with production heads of the Services.

Sudden changes of program required by the war will be brought before the Production Executive Committee by the Services, after approval by the Joint Chiefs of Staff. The Committee then will translate the new requirements into production changes.

Army-Navy Decorations

DSM

Col. Oliver S. Ferson, U. S. Ahumous award, "for exce meritorius and distinguished a duty of great responsibili serving as Director of War C tion and Movement." **Maj. Ge H. Hale**, Pittsburgh, Kan., Com Seventh U. S. Air Force, for strategical concepts" during th of Midway which "resulted in defeats of the enemy."

Silver Star

(Southwest Pacific)

First Lieutenant Hugh O. M Brooklyn, N. Y.; Technical S Walter B. Kolbus, Paradise, Ca geant Herbert M. Lemke, Shel Wis.; Sergeant Donald L. Os Boonville, Cal.; First Lieutenan Melikian, Fresno, Cal.; Second tenant Edward H. Steere, Jr., boro, N. C.; Second Lieutenants C. McGee, Staten Island, N. Y. U. S. AAF.

Purple Heart

(Southwest Pacific)

Second Lieutenant Gene F. Wilmette, Ill.; Second Lieutena R. Kingsley, Clinton, Ark.; Tec George L. Finkelstein, Phila Pa.; Private First Class Charles rell, Kaska, Pa.; Private Firs Morris Moskowitz, Brooklyn, N. vate Gordon W. Boutellier, Maine; Captain Stephen M. Girard, Kan.; Staff Sergeant Wa Walters, Inglewod, Cal., all o U. S. AAF

(European Theater)

Technical Sergeant Vincent T New Philadelphia, Pa; Staff Se Jack E. Falatic, Bangor, Maine; Sergeant Howard R. Thompson, sior Springs, Mo., all of U. S. A

(North Africa)

First Lieutenant Allen Acomb New Orleans, La.

Soldier's Medal

(Various Locations)

Staff Sergeant Verlan M. Davis land, Ill.; Staff Sergeant Rudol Kudlack, Grand Rapids, Mich.; Sergeant William E. Petersen, quette, Mich.; Staff Sergeant Ri Raezer, Jr., Westchester, Pa.; Sergeant Eugene A. Rynerson, Jo Kan.; Corporal Bruce G. Benso Moines, Iowa; Corporal James H breath, Lubbock, Texas, all of AAF.

(U. S.)

Second Lieutenant Frederick R Santa Rosa, Cal.; Technical Se Ronald W. Barksdale, Athens, Ala. Private Dominic J. Dibiasi, Co burg, Pa., all of U. S. AAF.

DFC

(European Theater)

Second Lieutenant Robert O. Sch Akron, O.; Sergeant William R. M tosh, Buchanan, Mich.; Private Class Joseph M. Walsh, South S ton, Pa., all of U. S. AAF.

(Hawaii)

Walter N. Nelson, Aviation Radi third class, U.S.N., Virginia, Minn.

XUM

Airacobra Pilots Going Into Action

HEADACHES FOR HITLER—Coming Up!

Over the loud speaker at a distant Allied Air Base comes the warning call "Enemy Aircraft Approaching—Scramble." In trigger-quick response—fighter planes are manned. Then, with deafening roar, a squadron of Army Airacobras takes the air.

Courageous and determined, these Army Air Force Pilots rise to combat, confident that they man the hardest-hitting single-engine fighters in the world. These men deserve the best America can put behind them.

A forward looking Aircraft Industry had sensed for years America's need for fighter planes that would out-fly and out-fight the best the enemy could offer. While ominous war clouds gathered into thunder-heads new plans and planes were under way.

Working with our Army Air Force we created the P-39 Army Airacobra. Free from precedent our engineers developed a new design from nose to tail. They put a cannon in the nose—placed the engine behind the pilot—gave it a tricycle landing gear. They made it a powerful weapon designed expressly for the needs of war.

Today these deadly fighter-planes serve Allied forces on fighting fronts around the world.

But some day victory will come. War-trained pilots will return to take their places in a new world of accelerated transportation. America will create new planes to carry on her commerce in the skies.

That day will find Bell Aircraft ready—ready with its engineering skill, assembly lines and trained personnel converted to the pursuits of peace-time aviation. © Bell Aircraft Corporation, Buffalo, New York.

Airacobras for victory—

FUTURE PLANES FOR PEACE

BELL *Aircraft*

PACEMAKER OF AVIATION PROGRESS

XUM

Army's AT-9 Transition Trainer

Navy's SNC-1 Advanced Train

Tomorrow's

ARMY AND NAVY HEROES OF THE AIR

SECOND PRINTING: Send 10¢ for **your** copy of this fascinating 96-page history of aviation by Assen Jordanoff, author of "Your Wings", with illustrations of current fighting types. Airplane Division, Curtiss-Wright Corp., Buffalo, N. Y.

Curtiss-Wright fighters, dive-bombers, observation and military cargo airplanes are conspicuous constantly in the war's headlines. But behind these headlines is another type of Curtiss-Wright ship—the trainer—in which thousands of America's superb fighting pilots today are winning their wings. Twenty-five years of development lie behind these modern training planes—for the world's earliest trainers were the famous "Jennys" of World War I.

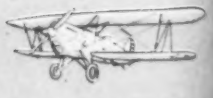
CURTISS-WRIGHT
Corporation
AIRPLANE DIVISION

FIRST
Since the Birth of Aviation

1917•The world-famous Jenny (JN-4D) of World War I. About 5000 were delivered to the U. S. Army Air Corps and our allies. Maximum speed, 75 m. p. h.

1927•The Curtiss Hawk (AT-4) Advanced Trainer. Its 190 H.P. engine gave this ship a high speed of 133 m.p.h.—a cruising speed of 106 m. p. h.

1929•The Curtiss Navy Fledgling primary trainer (N2C-1). High speed, 108 m. p. h.; cruising, 87 m. p. h. Powered with a Wright J-5 engine.



1930•The Curtiss Army Falcon (BT-4)—a basic trainer with a high speed of 140 m. p. h. and a cruising speed of 112 m. p. h.

Explanation

Why do German communiques nearly always claim more British planes destroyed than have actually been lost? British official sources last fortnight gave this explanation:

"An observer, who recently escaped from Germany, believes this exaggeration is not usually deliberate, but is due to the inaccurate system employed by the Germans. He points out that when there are few night fighters in the air and the RAF casualties are mainly caused by flak, British and German figures more or less coincide. It is only when there are several night fighters about that the German figures are higher than those of the Air Ministry. This, he says, is the result of several night fighter pilots claiming the same British plane as having been destroyed.

"As soon as a German pilot sees an aircraft which he has attacked going down, he phones to the ground: 'Sieg Heil'—the official signal for a 'bag.'

"On one occasion a ground station signalled all night fighters nearby, reporting a single British bomber in a certain sector. Four pilots acknowledged this message and stated that they were making for the sector. Probably the British plane got caught in the searchlight, for a few minutes later there were four 'Sieg Heil's' from four different pilots. All four came within the space of half a minute, so it was obvious that all four 'Sieg Heil's' referred to one RAF plane."

AAF in Liberia

U. S. soldiers have set up airports and are occupying Liberia, on the West Coast of Africa below Dakar, the U. S. government announced Dec. 3. First units arrived by plane last May, and a task force has since been established under Col. Arthur G. Kirchoff. Under an agreement, the U. S. has the right to construct, control, operate and defend airports and to assist otherwise in protection of the country, for the war period. An RAF detachment also is engaged in coastal reconnaissance and anti-submarine work.

Miller, Frank Shift

Assignment of Maj. Gen. Henry F. Miller, commanding general of the Air Service Command, as commander of the Air Service Command of the AAF in the European Theater, has been announced by the War Dept. Gen. Miller succeeds Maj. Gen. Walter H. Frank, who replaces Miller in Washington. These assignments were said to be consistent with the Army's policy of giving officers, when possible, experience in a combat zone.

Lightplane Picture Brighter; Large Orders in Prospect

Production prospects for manufacturers of lightplanes are brightening again, according to authoritative sources in Washington.

After several years of discouragement and delays, the manufacturers are about to get substantial quantity orders for a variety of planes ranging from 65 hp. to 200 hp.

Ever since civilian flying was stopped, lightplane companies found their only sales outlet in the Civilian Pilot Training Program, and to some extent, through the Civil Air Patrol. But obtaining sufficiently high priority ratings to keep the production lines moving, and to supply parts, has been an uphill battle from the start.

A number of Army ground service units wanted lightplanes for observation and liaison work, but obtained approval for purchases for limited quantities after a hard struggle against the Army Air Forces who considered the lightplanes to have only a nuisance value. Many of the initial obstacles have now been overcome, it is understood, and a coordinated purchasing program has been agreed upon in principle.

Lightplane companies have not been idle, but were forced to take on parts work or starve. Meantime they feared the stoppage of their lightplane production would mean the conversion of all of their present plant facilities to parts work, thus making it difficult to resume lightplane production should orders finally materialize. Fortunately there have been enough orders to keep the production going at a minimum.

Much of the credit for the current optimism is going to Irving Taylor, manager of the war production department of the Aeronautical Chamber of Commerce, who has consistently battled for lightplanes in the war program. Another important factor is John Morgan, representative of lightplane interests whose "Grasshoppers Club" has done much to popularize the lightplane movement in Washington. While details cannot be published, and while obstacles can still arise to upset the program, observers believe the dilemma of the lightplane companies is about to be solved.

Orville Wright Honored

Election of Orville Wright as an Honorary Member was announced by The British Institution of Mechanical Engineers on Nov. 24, according to press report from London. This is the Institution's highest honor.

High School Pupils to Receive CAA Air Knowledge Certificates

Students in 14,000 high schools which have instituted pre-flight aeronautics courses will be given an opportunity to qualify for a Civil Aeronautics Administration certificate of areonautical knowledge, Administrator Charles I. Stanton announced today.

The examinations, to be conducted by CAA representatives, will be identical with those given applicants for private pilot licenses. Students who pass them may for a period of 12 months offer their certificate as meeting the ground subjects requirements for the private pilot license, and will need to take only the medical and flight tests.

"This new type of certificate has been devised," Mr. Stanton said, "as a result of the tremendous response to the CAA program for bringing aviation education into the schools. Half of the nation's high schools have inaugurated pre-flight aeronautics courses this semester, and we feel there is a need to establish a uniform standard by which student achievement in this field can be recognized."

The first examinations under the new plan will be conducted in January, and at the end of each school semester thereafter. Principals wishing to have the tests given in their schools must make application to the CAA at least 30 days before the beginning of the month in which they desire the examination be held.

Artillery Scout: 1943 orders for more lightplanes by Army ground forces are forecast by Washington observers. This Taylorcraft L-2B, replacing old-fashioned artillery balloons for observation, is typical military lightplane.

Important CAA Positions Filled

John E. Sommers has been appointed Deputy Administrator of the Civil Aeronautics Administration, according to announcement Nov. 29 by Charles I. Stanton, Administrator.

Sommers, former CAA regional manager at New York City for a territory extending from Maine to Virginia, succeeds A. S. Koch, who has been called to active duty with the Army Air Forces.

Sommers

Other appointments announced by Mr. Stanton to fill key CAA positions vacated by reserve officers called to service are as follows:

Fred Lanter, as director of safety regulation, replacing John Warlick, and E. R. Scroggie, from Santa Monica, California, to fill Mr. Lanter's former post as chief of the general inspection division.

Robertson

Kline

H. A. Hook, formerly regional superintendent of airways, succeeding J. S. Marriott as CAA regional manager at Santa Monica for California, Nevada, Arizona, and Utah.

William E. Kline, also former airways superintendent, taking over Leonard Jurden's managership at Kansas City of Kansas, Missouri, Nebraska, Iowa, South Dakota, Wyoming, and Colorado.

Morris

Hook

William Robertson, promoted from superintendent of safety regulation to regional manager at Atlanta, succeeding George Vest, in charge of Georgia, the Carolinas, Tennessee, Alabama, Florida, Mississippi, and the part of Louisiana east of the Mississippi River.

Paul Morris, superintendent of airports at Seattle, named regional manager for the states of Washington, Oregon, Idaho, and Montana.

Dryden Elected to Head Institute

Institute of the Aeronautical Sciences Inc. has elected Dr. Hugh L. Dryden of the National Bureau of Standards, Washington, D. C., to succeed Hall L. Hibbard as president. Hibbard is vice-president and chief engineer of Lockheed Aircraft Corp.

Dryden

At the Bureau of Standards, Dr. Dryden is chief of the Mechanics and Sound division, his work in physics concerned chiefly with fundamental research in aerodynamics and hydrodynamics. He has also supervised research on aircraft structures and aircraft instruments.

Aircraft Committee Elects Officers

National Aircraft Standards Committee of the Aeronautical Chamber of Commerce of America, Inc., Washington, D. C., has announced that at the fourth annual meeting of the committee, held in New York City at the Hotel Lexington, Nov. 11, 12, 13, the following officers were elected:

National chairman, Eric Dudley, Curtiss-Wright Corp., (division not specified); chairman, Eastern division, W.D. Craig, Jr., Grumman Aircraft Engineering Corp., Bethpage, L.I., N.Y., and W. H. Colcord, Kellett Autogiro Corp., Philadelphia, Pa., vice chairman; chairman, Western division, G. T. Waite, Consolidated Aircraft Corp., San Diego, Cal., and Charles Sardou, Vultee Aircraft, Inc., Vultee Field, Cal., vice chairman.

Also announced were three changes in the Executive Board of the Committee. Eric Dudley has succeeded John F. Cramer, Boeing Aircraft Co., Seattle, Wash., as national chairman; W. D. Craig, Jr., has succeeded J. T. Thompson, Glenn L. Martin Co., Baltimore. Md., as chairman of the Eastern division, and G. T. Waite succeeded C. T. Torresen, North American Aviation, Inc., Inglewood, Cal., as chairman of the Western division.

Sievert Joins USAU

United States Aviation Underwriters, Inc., New York, N. Y., announces that Will C. Sievert, formerly air safety investigator in the Washington and Chicago regions for the Civil Aeronautics Authority, has joined their organization, with headquarters in the home office. Sievert was at one time chief pilot for the old Universal Airlines organization. More recently he was manager of the Chicago region for the Clayton Knight committee, which was instrumental in obtaining American pilots for RAC, RCAF and for the trans-Atlantic and English ferrying services.

War Agencies Review

TO PROTECT INDUSTRIES FROM A DRAIN OF NECESSARY MEN, War, Navy, and Selective Service System issued joint statement ending enlistment of essential employes in the Armed Services. "Effective Nov. 23, 1942, the Army and the Navy will not accept for voluntary enlistment essential employes in the aircraft and shipbuilding industries or those essential employes within those industries who have resigned within the preceding 60 days," Gen. Hershey said, referring specifically to men in Classes II-B or III-B. SSS officials explained that this was not a blanket deferment of workers in these industries, "who will continue to be called for military service as they are needed and as they can be replaced in essential jobs."

At the same time, the War and Navy Departments issued a statement directed to "All Employes in Essential War Industries" advising that "men who are engaged in this vital work should remember that your Government and your fellow citizens, are clear in their convictions that you are doing your full duty in staying at your present posts unless and until you are called or until your services can be spared. An impression has apparently been created that a man who enlists will enjoy advantages with respect to promotion, assignment of station, etc., over a man who is inducted. This is incorrect. In such matters the Army treats the enlistee and the inductee on an equal basis. We have no doubt that in many cases it may seem to involve a greater personal sacrifice to stay on the job than to march away. If this is so, it is a sacrifice that we call on you to make."

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SPECIFIC OCCUPATIONS WHICH WILL BE CONSIDERED VITAL TO WAR PRODUCTION and therefore ground for occupational deferment have been listed by War Manpower Commission, under 35 categories of essential activities, headed by "Production of Aircraft and Parts." The list has been made available to regional offices of USES and local draft boards. Occupations are those which require at least six months' training and are designated as "necessary."

By this plan, employers can adjust operations to the draft by setting up "Replacement Schedules," according to Manpower and Selective Service spokesmen, and an "orderly withdrawal of employes into the Armed services can be arranged." The agreement with Selective Service provides that employers shall submit their "replacement" lists to State directors and validate them, returning them to local draft boards to guide deferment actions. The lists will be subject to review by WMC officials and will continue in effect for a maximum of six months. During the half-year period, employers will be expected to complete an inventory of their total labor supply and make plans to replace draft-age men in accordance with established manpower-control principles.

This inventory, the Manning Table Plan, must be put into effect at the end of six months, or employers will lose the benefit of having replacement schedules. In that case, WMC warns men might be drafted for military service from an employer's plant regardless of their value. Although Manpower officials indicate that they are determined to get broad compliance with the program, there is still no assurance that local boards will take into account the recommended deferments in fulfilling Army draft quotas. However, when the State Selective Service director approves the employer's Manning Table, he assigns a state acceptance number to the employer who will be authorized to use this number and to place a stamp bearing that number on the requests he then files for occupational deferment of his men. These requests are made on special Form 42A and supplant any prior requests for occupational deferments. The plan is now being tried in the Detroit area for 650,000 war employes, in its first overall checkup, but it has also been in partial effect in other industrial centers, including some aircraft plants.

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PUBLIC HEARINGS AND EXAMINATION OF EMPLOYMENT PRACTICES in war industries will be conducted by the President's Committee On Fair Employment Practice in Detroit, St. Louis, Cleveland, Philadelphia and Baltimore. First hearing will be in Detroit, and others are scheduled at 6-week intervals.

In an unprecedented action, the Committee directed Pittsburgh Plate Glass Co. to reemploy seven members of Jehovah's Witnesses, who were discharged last December when they refused to participate in a flag raising ceremony and thereby aroused the antagonism of fellow employes. The Committee also notified the unions involved that they would be expected to "exercise the necessary control over their members."

●

PRICES FOR REPAIR PARTS or specifically designed airplane servicing and repair tools for which maximum prices are established need not be filed by manufacturers of aircraft and aircraft engines, OPA announced. Explaining Amendment 56 to Maximum Price Regulation 136, officials said many manufacturers did not have published price lists and compiling of prices for filing meant extensive paper work in preparing the lists from card index systems, some companies listing as many as 100,000 or more repair parts on their books.

Executives Seek Relief From Questionnai

Interest of Congressional le in curbing the flow of unnec or duplicating government que naires to the aircraft and oth dustries was praised by aviati ficials who look to Congress fo lief from a Washington barra blanks taking thousands of hours a month to answer.

Congressmen and Senators ar determined to cut the numbe volume of government reports required of business.

Legislation expeditiously upon by both Houses would thorize the Director of the Bud determine, in the first place, wh questionnaires being sent out b various departments are nece and whether the information s can be obtained from another W ington agency. Exemptions given the Treasury Dept. The Se tary of the Treasury may con to require all information he d necessary on tax returns and th formation is not to be turned ov other government agencies.

To implement the legislation Byrd's Committee, after a quick thorization by the Senate, bega investigation of the question practices of government age Businessmen have amazed Sen at Committee hearings with ex tions of voluminous reports complicated form code numbers the investigation proceeds, re sentatives of the governm agencies will appear "to give side."

CAA Asks Budg OK For Mechani

Civil Aeronautics Administra has completed plans for training 000 aircraft mechanics and tec cians, and the program is being viewed by the Bureau of the Bud

Of the 25,000, nearly 20,000 wi trained for the Army, and about 000 will be trained by CAA a backlog to take care of civi needs which are directly connec with the war effort.

Authority was extended CA train mechanics, as well as pi under legislation introduced by S Randolph (D., W. Va.) and sig by the President in July.

Aviation observers are hop that the estimate for aircraft m anic program will be submitted supplemental bill and not held for the regular 1944 fiscal year C merce Dept. appropriation.

Relief Wings Moves

Relief Wings, Inc., headquar has been moved to Airlines Te nal Building, Suite 408, 80 42d Street, New York. Besid 200 mph air ambulance whic maintained at LaGuardia Airpo day or night emergency service organization also has 30 fl Nurses and 10 Flight Surgeo call in New York City alone f ambulance or air-borne relief

XUM

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for America

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Military Cargo Planes 'Tailormade' For Post-War Use, Wood Says

ees Future hips Carrying ixed Loads

ILITARY cargo planes be- ing used in World War II l be practically "tailormade" the job of hauling freight the post-war period, accord- to Carlos Wood, of Douglas rcraft Co.

peaking in Chicago Dec. 9 at the cargo engineering meeting spon- d by the Chicago section of the iety of Automotive Engineers, od asserted that "common sense ign of good military cargo planes produce efficient airplane types future use in peacetime."

e thus differed with some "ex- ts" who have claimed that almost military flying equipment will e to be junked after the war.

ood also said it was reasonable assume that future passenger es will be supercharged "and it st be remembered that most fu- airplanes will carry a mixed d" A supercharged cabin cargo e will probably pay its way n the efficiency standpoint if the ercharged altitude for the plane its power plant is such that ge weight penalties are not in- ved.

ollowing are excerpts from od's paper:

n the light of past history and erience we feel that it is safe to ect a major expansion in the t-war use of airplanes for the nsportation of passengers and go.

Time for Analysis

As a result of this trend, it ap- ars that the time has arrived a dispassionate discussion of factors involved in the design airplanes for cargo transporta- n. It is still not too late for the sults of such an analysis to be ful in the design of cargo carry- airplanes that will go far ard winning this war. It is w time to investigate the bases economical operation of cargo planes that will go far toward ning the peace.

Military operations are normally ntrolled by an economy of scar- y. Some things are always near minimum of safe quantity in y campaign. The main enemies hind our own lines are time and stance. For any given unit of nsportation the utility can be pressed as the ability to trans- rt a certain amount of pound les per hour of men or materiel. s a result, the airplane that will nsport the largest number of unds at the highest block to ck speed for any given range ll be the most useful.

The availability in numbers of airplanes comparable with the man hours to produce those airplanes may be best expressed by the air- plane's weight empty as man hours for production have been found to be essentially a function of the weight empty.

Landing Speed

It is suggested that the utility of the airplane may in many cases be affected by the landing distance or the takeoff distance as these distances will have an effect on the man hours necessary to build and maintain any usable operating bases. The landing distance varies approximately with the square of the landing speed. The takeoff distance is a function of the land- ing speed and the power loading. As a result, we suggest that an additional factor in the cargo utility of an airplane is the landing speed.

The above items should all be considered in the determination of a comparative "Cargo Utility Fac- tor"

$$C.U.F. = \frac{\text{Cargo Load}}{\text{Weight Empty}} \times \frac{\text{Range}}{\text{Flight Time} + \text{Handling Time}} \Big/ \text{Landing Speed}$$

which is a function of the range of the airplane at a given gross weight. It will be noticed that this factor is the product of a weight ratio and a speed ratio, or a more or less conventional means of de- termining efficiency of operation.

Thus far we have considered only military operation. Is there any comparison to the requirements of efficient commercial operation? As would be expected the analogy is immediately seen.

It was mentioned that the weight empty gives a figure representing the number of man hours to pro- duce one airplane or one group of airplanes. Those man hours rep- resent a cost in dollars and cents. Also, this weight represents an op- erating cost in dollars per hour, the heavier the airplane the higher the cost of operation per hour.

The landing speed will give an index of the cost of maintaining the running gear portions of the airplane and also of the ground facilities necessary for successful operation of the airplanes.

Thus the two factors in the de- nominator of the expression for C.U.F. represent a cost in man hours, or in dollars and cents per hour if desired.

With this analogy in mind it is easy to see that the expression for C.U.F. is such that

$$\text{C.U.F is proportional to } \frac{\text{pound miles}}{\text{dollar}}.$$

In other words, a high value of C.U.F. corresponds to a low cost per pound mile. This result leads to our belief that common sense de- sign of good military cargo planes will produce efficient airplane types for future use in peacetime.

Efficient Handling

Any successful airplane must be designed for the job it has to do. Any good cargo plane must be built around the cargo compart- ment. This is a truism for either military or commercial designs. The compartment must be large enough to contain the cargo and must be properly located with respect to the remainder of the airplane to allow its use to the fullest extent. The compartment should be prop- erly designed internally to allow efficient handling of cargo when in- side of the plane to allow efficient use of the space available, and to allow easy and positive tying down of cargo once loaded.

If we look at a humble freight car we see a very simple enclosed space. Experience has shown that a freight car is a purely utilitarian article. We can learn a lot from it. The floor is flat and generally level. The floor is at a height from the ground that best fits into the eco- nomical design of the car and its

(Turn to page 18)

Military Cargo Planes Will Have Post-War Uses, Wood Says

Chicago Meeting

(Continued from page 1)

has a great future, but it will be *a part* of the overall trans- portation picture.

Thus they echoed sentiments expressed in recent published articles and in speeches by As- sistant Secretary of War Rob- ert Lovett and United Air Lines President W. A. Patter- son.

On other subjects, opinion varied. Some speakers thought combination passenger-cargo planes would be the post-war answer; others favored all-cargo ships. Some said military cargo planes would play a big part in post-war developments; others said no. There were numerous opin- ions on how deeply air transporta- tion will cut into post-war surface traffic.

Speakers and their subjects were Charles Froesch, chief engineer, Eastern Air Lines, "The Deficiencies of Converted Passenger Airplanes for Cargo Operation Requirements"; Karl Larson, chief engineer, North- west Airlines, "Terminal Handling of Air Cargo;" C. G. Peterson, chief engineer, Railway Express Agency, "Packaging and Handling of Air Cargo;" J. Parker Van Zandt, di- rector, Office of Air Transport In- formation, Department of Commerce, "Some Aspects of Air Cargo Opera- tion in Latin America;" J. V. Shee- han, manager industrial division, Lockheed Aircraft Corp., "The Eco- nomics of Post-War Carriage of Air Cargo;" Col. E. S. Evans, presi- dent, Evans Products Co., "Securing Means for Air Cargo;" H. D. Hoek- stra, assistant chief of CAA's air- craft engineering division, "Struc- tural Materials for the Cargo Air- plane."

Carlos Wood, proposals engineer, Douglas Aircraft Corp., "Airplane Design for Cargo Transportation"; Commander C. H. Schildhauer, Naval Air Transport Service, de- scribing the air cargo activities of NATS; Col. Harold R. Harris, as- sistant chief of staff, plans division, Air Transport Command, "The Im- portance of Air Cargo in the War Effort."

Richard C. du Pont, president of All American Aviation, "Air Pickup and Gliders As Related to the Fu- ture of Air Cargo"; Maj. L. D. Bar- ringer, chief, glider unit, Directorate of Air Support, Army Air Forces, "Gliders for Transport."

Chairmen of the different sessions were William C. Littlewood, vice president-engineering, American Airlines; William A. M. Burden, special assistant on aviation to the Secretary of Commerce; P. Altman, Vultee Aircraft, and Charles P. Graddick, director of United Air Lines' express-mail-freight depart- ment. Toastmaster at the banquet was William Stout, president of Stout Skycraft Corp.

Stories on the speeches at the meeting are contained in this issue of AMERICAN AVIATION and will also ap- pear in the Jan. 1 issue.

XUM

Wood Sees Post-War Use for Military Plane

(Continued from page 17)

loading. The car is about 40 feet long, eight feet wide and nine feet high. The doors are on the side and large enough to allow the rapid loading of cargo, being about six feet long by eight feet high on a normal car. This then gives an idea as to a practical compartment size to work toward.

Need Level Floor

This then gives a place to start in the design of an efficient cargo plane. If at all possible, the cargo compartment should have a level floor, adequate width and height throughout its length. The loading door must be of ample size and should be so arranged as to allow easy loading of the cargo.

The compartment must be located with respect to the wing in such a position as to hold the center of gravity of the airplane, loaded and unloaded, between the required limits for the airplane. Generally about one third of the length of the compartment should be ahead of the 25% point of the mean aerodynamic chord of the airplane. This applies for normal design practice. More unique designs may modify the above location.

There continually is expressed either personally or in the press a tremendous amount of misinformation concerning the utility and cargo carrying abilities of new, larger and different types of cargo planes. Much study has indicated certain general trends to expect in planes with varying size and various basic parameters.

Tough on Designer

For example, the designer is often told, "Make it bigger—or bigger yet—then we'll really have low cost transportation (or we'll really be able to carry a lot of pound miles per hour)." Such a challenge is tough on the designer. He'd like to build them larger and larger, that's the way the imagination runs. But about this time some doubting Thomas breaks in and says, "Yes, but will we *really* be able to carry more pound miles per hour per man hours expended (or be able to carry cargo at a lower cost per pound mile)?" Questions like this must be answered as they determine any common sense solution of either our military or commercial problems. Comparisons of designs either now in service or soon to go into service bring out the fact that the maximum C.U.F., or best economy, is not apparently a direct function of size of airplane. However, the range at which the utility or economy is available is apparently a function of size only, the larger the airplane the longer the range at which the desired utility or economy is obtained. This is due partly to a slowly increasing percentage of useful load with size and partially due to increasing aerodynamic efficiency of the airplane with increase in size. The increase in percentage of useful load is not automatic but is due primarily to unceasing developments in materials and design.

For a given size of airplane the range at which maximum cargo utility is available and also the maximum range is naturally a function of the basic layout of the airplane. As a result, design conditions must be set up to define the conditions under which it is intended to use the airplane.

At the beginning of studies of a new plane consideration must be given to all factors insofar as possible in order to produce an efficient machine for the designed use. The basic factors to be considered for a cargo plane are: (1) Weight, (2) Drag, (3) Span, (4) Power, (5) Stalling speed, (6) Handling time.

Certain special conditions envisaged for the use of the cargo plane will often affect the basic design. Sometimes such conditions may be of such importance that a special design seems to be called for that is not an optimum arrangement for normal use. However, whenever possible, it is necessary to make any design of such a flexible nature that it will not be useless in every condition but one special type of use. This necessity produces the most headaches in the design room; to produce a design of good general utility that will also meet, or come close to meeting, all the special conditions of operation.

'Invaluable Adjunct'

Military operations are a prime example and will be more so for the next few years. Much has been written lately by all of these unknown "experts" about how the cargo airplanes will replace all the shipping and all the railroads. The more that we study this problem the more we feel that this is not the case. The cargo plane is an invaluable adjunct to present means of transport. Nothing else can deliver comparatively small quantities of critical materiel so rapidly over reasonable ranges. When velocity of replacement is needed the cargo plane is the thing. When mass of replenishment is necessary the ship still stands alone. But all the cargo planes that will be built will be none too many to take care of the "shock" requirements. This is our present field and it should be recognized as such.

It should also be realized that any airplane needs fuel. With the tremendous demands being made on our aviation fuel supply the problem becomes acute. Our western hemisphere is one great source of supply. The United Nations have only one other large source—the Near East. To save transportation of that fuel all over the world it would be most useful if all flights could be round trips without refueling from one of these sources. . . .

Military operations sometimes do not have much choice as to cargo destination. If comparatively heavy cargo is carried suitable handling equipment must be carried within the airplane itself to allow proper cargo loading and unloading. This in many cases will reduce C.U.F. due to the weight involved and present a considerable design problem.

Combat conditions bring a whole new set of troubles. Undoubtedly it will be necessary to fit some defensive protection to our military cargo planes that will be operating in or near the zone of operations. For tactical reasons glider tugs may be required with all of the structural and cooling troubles that are involved. Certain types of cargo planes for actual tactical use will have to be built with much of the design subordinated to extremely rapid unloading under fire. These are all items that will require much design thought and ingenuity.

Handling Important

Commercial applications in the future will need more consideration in detail. It is well agreed that the quantity of traffic will increase terrifically in the future. This will require improved means of handling cargo, storing cargo, and dispatching cargo. Suggestions have been made for standard size packaging. This is a good thought from the operator's standpoint but would undoubtedly cause considerable difficulty from the shipper's standpoint. The thing that appears to be necessary is more available flexibility in design for cargo stowage, not freezing of cargo size.

As cargo traffic increases the network of places served will also probably increase. At major terminals suitable facilities for cargo handling will be available, but at smaller stations this will not be the case. Three courses are open: (1) Design simple ground based handling devices, (2) Design suitable airplane carried handling equipment, (3) Design the airplane more with cargo loading in mind.

The first course is outside of our province, the second will involve a reduction in utility as we have seen. The probable answer will be to go as far toward designing for cargo handling as we can without suffering from weight and aerodynamic difficulties.

Supercharging

One other item should be mentioned briefly, that of supercharging. It is reasonable to assume that future passenger planes will be supercharged and it must be remembered that most future airplanes will carry a mixed load. The speeds of operation go up with increase in altitude, increasing the utility. Present indications are that the supercharged cabin cargo airplane will probably pay its way from the efficiency standpoint the supercharged altitude for airplane and its power plant is that large weight penalties are involved. This fact practically forces us to the circular fu or something quite close to it.

This brings us to the dream again—what are the design in cargo planes? Being a pr is a sad business, as the be well laid plans generally changed. However, certain are evident both from a m and a commercial standpoint.

(1.) Operation at higher alti apparently on its way. Th may expect circular section lages.

(2.) The cargo compartmen have a flat floor and will be general dimensions of a freigh

(3.) The use of airplanes mixed cargo and passenger loads call for a re-examination of air arrangement for more versatil

(4.) Every attempt will be m reduce the distance from the g to the cargo compartment. may call for some rather fro designs until we get on the b

Conclusion

Presently available evidence dicates that we will have a te expansion in cargo transporta by air during and after the pre war. Cargo compartments will doubtedly be as simple and as as possible, being of a design is flexible enough to allow carg of a large range of cargo. W proper care, both as to engineer practice and economy of use, m military airplanes will be conv ible to cargo use. The mili cargo airplanes will be practic tailormade for the job.

The only really effective wa increase the utility (or decrease costs of operation) of cargo pl is to strip them down to a m mum weight empty or over them above normal gross wei The installed power must be m as possible and still meet the or practical operating limitat These things are very import either when economy is the te when maximum utility is des as the cargo plane always work a disadvantage from the standp of efficiency—it must be remembe that it may have a lift to d ratio of 20 to one, but a rail train has a lift to drag ratio of a 100 to one, and a steamship oper at about 500 to one. We must c all the corners possible.

Thus is may be seen that th present intensive developments i military cargo planes may form th basis of future operations in pe time. The military cargo plane essential to our winning of th war with its terrific problems i time and distance and, proper used, should provide a power means of winning and maintaini the peace after this present co vulsion is over.

XUM

THE margin between victory and defeat in these breathless days of highly mechanized warfare can be decided by the performance of a single piece of equipment. As in the great battle of the Coral Sea, one brief radio message . . . *and thus the aircraft transmitter which puts it through* . . . may alone stand between the nation and possible disaster.

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Specially-Designed Freight Aircraft Needed for Post-War Use—Froesch

Finds Converted Ships Unsuitable in Long Run

LISTING 10 of the most important reasons why present converted passenger planes are not suitable for the large-scale carriage of cargo, Charles Froesch, chief engineer of Eastern Air Lines, has indicated that a specially-designed fleet of air freight carriers will be necessary in the post-war period.

Speaking in Chicago on Dec. 8 at the Air Cargo Engineering meeting sponsored by the Chicago section of the Society of Automotive Engineers, Froesch also indicated that the ideal cargo plane has yet to be built. Most suitable, he said, would be a twin-engine or a four-engine high-wing ship with tricycle landing gear.

Froesch

The speaker urged consideration of handling less-than-carload-lot freight as second-class or deferred express, bearing a lower rate. He mentioned the possible use of cargo glider trains with takeoff and landing strips alongside factories simulating present railroad sidings.

A partial text of Froesch's address follows:

Only ten months have elapsed since the airlines of the United States were called upon to begin the transportation of cargo on a large scale for the Military Services. The volume of cargo so far flown and its rate of daily increase have presented cargo handling and transporting problems which must be satisfactorily solved before air cargo transportation can become a routine operation.

Expedient solutions are meeting the present emergency but fundamental thinking and reasoning must be followed to derive specifications applying to cargo airplanes in order to establish the transportation of air express and air freight as a commercial business at the termination of the war.

Flying has become an accepted means of transportation by the commercial traveler as well as the vacationist but the carriage of goods by air has lagged primarily because of the lack of suitable flying equipment and handling facilities. Furthermore, the relatively small amount of space available for air cargo has been indirectly the cause for the existing high tariffs which, in most instances, have been higher per pound per mile than comparative passenger rates.

When it became obvious at the beginning of this war that speed of transportation for critical military materiel was essential, it was logical that available passenger equipment in use, or already designed and ready to be produced, should be quickly altered to meet this immediate demand.

The result was that airline equipment was pressed into cargo operating service literally overnight and speedily converted for such service by the removal of all passenger accommodations, strengthening the floors with additional covering and changing the radio equipment to meet military requirements.

Conversion Effective

This conversion was effective, although rather inefficient insofar as maximum ratio of useful load to gross weight is concerned, but this was partly offset by lifting commercial weight restrictions and increasing takeoff weights in the order of 20% with surprisingly safe and reliable results, which incidentally, emphasize the conservativeness of commercial equipment maximum operating weight ratings.

The standard Lockheed Lodestar, Douglas DC-2 and DC-3 transport airplanes were thus modified and are doing an excellent job. Later on, production of the C-47, which is basically a DC-3 cargo version having a large side loading door; the C-46, a modification of the original 36 passenger Curtiss-Wright CW-20 commercial transport airplane; and the C-54, a conversion of the production DC-4 airplane, swelled the ranks of cargo airplanes to expedite movements of military personnel and materiel. A more recent modification was that of the Consolidated B-24 four-engine bomber to long range cargo carrier and known as the C-87.

While the following discussion covers the deficiencies of all these airplanes as applied to air cargo operation, it must be remembered that none of them was designed strictly as cargo carriers or for conversion to air cargo transportation and, therefore, none of these criticisms and shortcomings can or do reflect, in any manner, on the equipment manufacturers themselves.

Opinions Differ

In the first place, no one knew just what a cargo airplane ought to be and with limited airline experience in cargo operation, much difference of opinion still prevails on the characteristics and specifications involved in the design of this type of airplane. . . .

Let us, therefore, analyze the deficiencies of these converted airliners and outline suggested modifications for future equipment in the light of our limited operating experience.

First of all, we find that the conventional type of landing gear renders loading of the cargo compartment with heavy cargo pieces difficult because of the floor gradient. This is aggravated by the lack of anchor points for hoist attachment to help pull heavy items at the entrance door or in the cabin. Also, in order to have a necessarily horizontal floor in the region of the loading door, the main floor makes an angle with it and causes concentrated loading when handling heavy long pieces of cargo with resultant floor damage.

Floors Weak

Second, we find that the standard passenger cabin floors are too weak to stand concentrated loads as well as the rough usage to which they are now subjected as cargo carriers. This has demanded their reinforcement by either strengthening the present floor structure or cover it with an additional floor. T supplemental floor consisted g erally of plywood sheeting ¾ ¾" thick and has been found q serviceable although it substanti increased the empty weight.

Doors Narrow

Third, we find that in the m verted airliners, the cabin entra door is too narrow and too lo take the bulkier cargo pieces. restriction seriously impedes cient loading and unloading limits the size of cargo pieces w can be handled. This is an im tant item when it is considered the size of cargo pieces may c monly run from an article so s as to require wrapping its shi label around it instead of pa it to automotive units mea almost 13 ft. in length, 6½ ft width, 4½ ft. in height and w ing 2,500 lbs. Occasional loads h have greater dimensions an weight. It would be desirable have an additional door, located posite, to enable simultaneous ing and unloading and thus time on the ground, particu when one or two pieces of a are difficult to handle, either d size or weight.

Fourth, we find that when have placed the cargo within airplane in its proper location means are available to anchor tie-down cables, ropes or devices used and a makeshift stallation must be provided.

Tie-Down Varies

Each type of cargo presen somewhat different problem in down procedure. Methods of down vary with individual in interpretation due to lack of p provision in the airplanes. S airplanes have ring tie-down t teners attached to the floor fra others have side rails and others employ a combination both means. The most com practice is to use ropes tied in indiscriminate manner, usually allowing the fancy of the han lashing the cargo. Nets are used need frequent replacement.

Many ideas are being tried e each particular type has its merits and drawbacks. No m what tie-down means are succes fully developed, their satisfact application will depend primarily the proper training of the loadi personnel in their use.

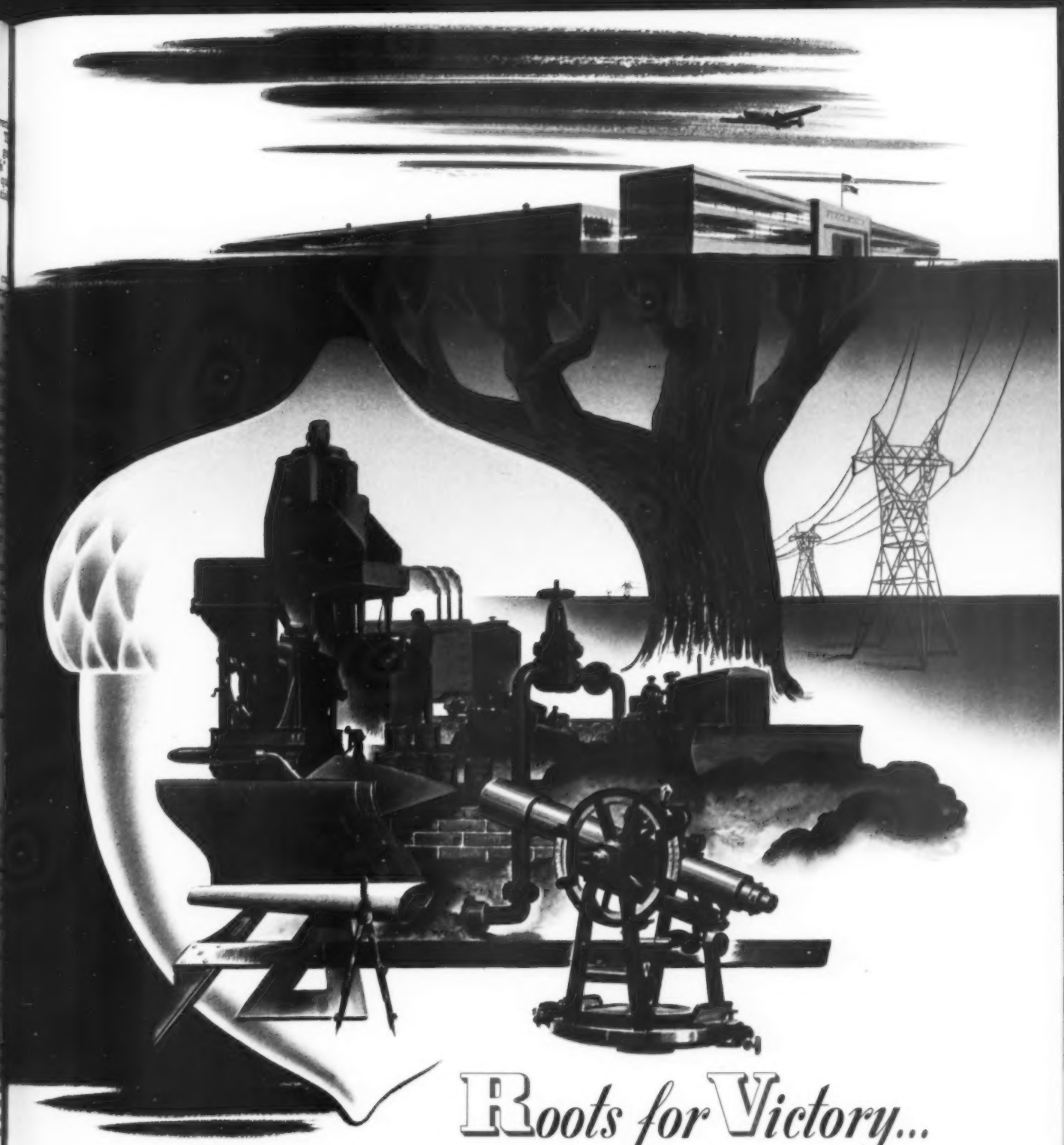
Fifth, we find that no provisi are readily available for a cre handler station.

Sixth, we find a lack of simp and concise information to pers the loading personnel to accurate distribute the cargo load within th prescribed balance limits. In addi tion, it is often difficult to pla heavy pieces within the cabin s still retain a center of gravity loc tion which will not serious affe longitudinal stability as well a takeoff and landing characteristi

For instance, when a load of 6,0 lbs. is carried in the C-49, its C

(Turn to page 24)

Converted Planes' Doors Too Narrow for Cargo, Froesch Says

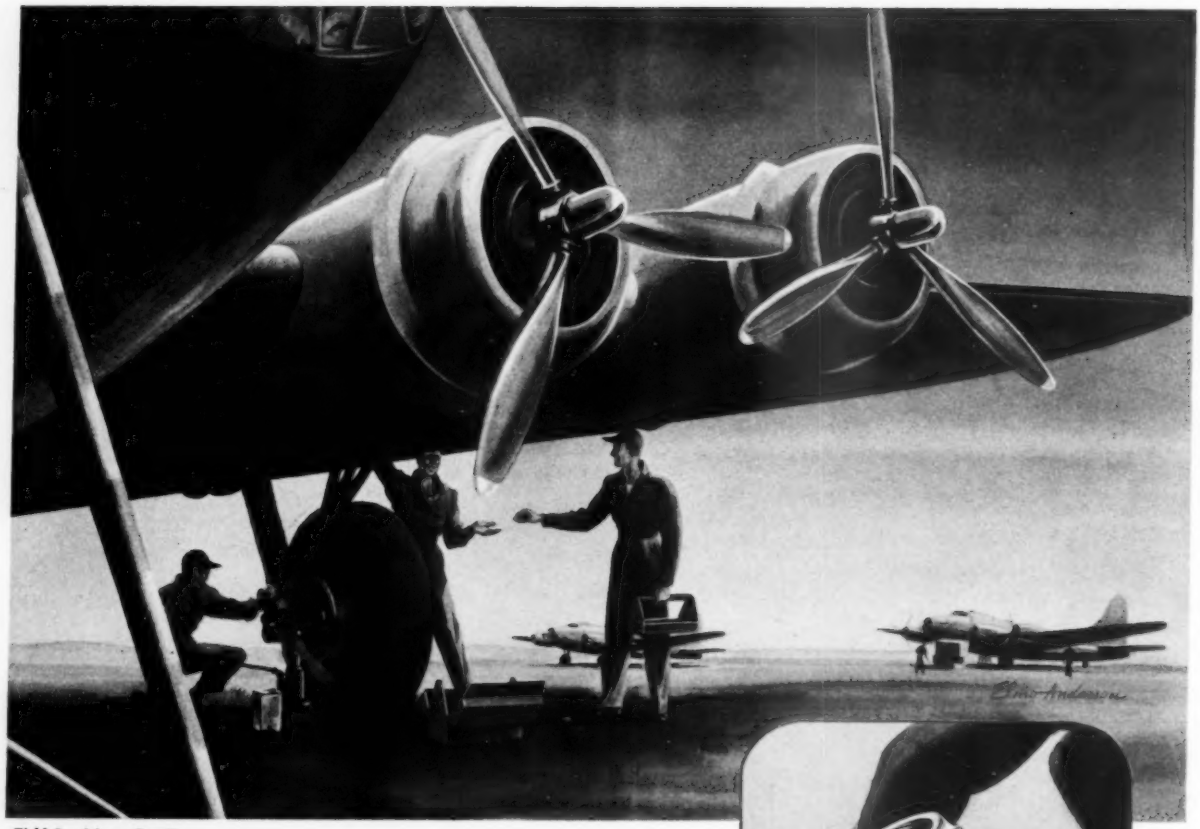


Roots for Victory...

Like the Harvest, America's production is the fruit of many labors. To those who have helped so greatly in the past year — the planners, the builders, the workers . . . the men in many fields of activity whose efforts have speeded our program — Wright extends its appreciation for accomplishment.

WRIGHT *Aircraft Engines*

POWER THE TONNAGE OF THE AIR



Field-Servicing a B-17E

"THE LIEUTENANT WILL BE GLAD TO KNOW"...

Any pilot is glad to know that the ship he flies is protected with Boots all-metal, self-locking nuts. That knowledge gives him an added sense of security, because Boots Nuts are safer; even the severest vibration cannot jar them loose. They are unaffected by the corrosive action of oil, chemicals, or weather. Their resistance to high temperatures is almost phenomenal. In fact, they literally "outlast the plane."

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On every battle front in the world, on every type and 'most every make of plane, these ingenious fastening devices are contributing to the striking power of our Air Force.

It's Self-locking

The Boots principle of self-locking as employed in the Bellows, Wing, and Rol-Top (illustrated above) styles are well-known throughout the aircraft industry. In each case the nut is one-piece, all-metal. The self-locking action is obtained by means of the out-of-phase locking collar connected to the lead threads by means of a resilient spring member.

Here are a few of the planes fabricated with Boots Nuts:

Grumman Wildcat F4F-3
Boeing Flying Fortress B-17
North American B-25
Curtiss Commando C-46
Consolidated Liberator B-24E
Curtiss P-40
Curtiss Dive Bomber SB2C-1
Edo Floats
Plywood Planes
Brewster Buccaneer

BOOTS

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All-Cargo Plane Seen as Ultimate Answer for Post-War Trunk Lines

ALTHOUGH combination passenger-cargo planes may be used for a short time by post-war trunk airlines, the ultimate answer will be the exclusively cargo plane, J. V. Sheehan of Lockheed Aircraft Corp. told the air cargo engineering meeting sponsored by the Chicago section of the Society of Automotive Engineers on Dec. 8.

Sheehan predicted that combination planes will be used until the trunk line and primary connecting carriers develop the groundwork for servicing and handling of cargo, but that then they will give way to all-cargo ships.

Development of larger and more efficient aircraft will bring airplane operating costs down to the point where the present rail express, first-class mail and less-than-carload lot freight fields will be sources of air cargo business, he told the meeting. He added, however, that "the airplane potential in the over-all transportation scheme is of a supplemental nature and not one to replace the railroads or the steamships."

The secondary feeder and off-line feeder plane, as distinguished from trunk line equipment, will be a convertible efficient combination passenger and cargo plane, the speaker said.

2 Engines Economical

"The largest airplane which can be built will offer the cheapest operating cost per ton-mile," he continued. "This necessarily assumes that sufficient payload will be available for this airplane. It has been shown that a two-engine airplane is the most economical to operate if the payload requirements do not dictate an airplane larger than can be handled by the two biggest available engines."

Sheehan's remarks on air cargo potential and on all-cargo planes follow:

"It was pointed out in an air cargo study recently completed that the strategic cargo required to be exported from the United States in the next twelve months will total between 40 and 45 million tons. This reaches a total movement—using airline distances of—of approximately 220 billion ton miles. Of this about 20% of the nonmilitary commodities for export was suitable for air cargo. However, about 50% of the present-day military exports is so suitable.

"In 1941 Class I railroads originated 2 billion tons of freight. Of this amount 684 million tons (56%) constituted coal, ore and other products of mines which, on cost basis, would not be shipped by air.

"An additional 189 million tons, or 15%, consisted of products of agriculture, animals, and forest products which also, to a large degree, will not be subject to air shipment in the near future. From this latter classification, perishables—fruits, meats, etc.—will be eligible for air shipment, and foods generally, particularly if strides are made in dehydration.

"The bulk of rail freight which would be subject to air freight competition would be in the field of less than carload lots, and manufactures and miscellaneous items. In 1941, l. c. l. freight totaled over 18 million tons. With manufactures and miscellaneous items amounting to more than 336 tons a gross total of 355 million tons (or the equivalent of less than 30% of total rail tonnage originated) moved over the Class I Roads.

"It is our belief that the airplane potential in the over-all transportation scheme is of a supplemental nature and not one to replace the railroads or the steamships. And, the airplane's claim to carry its part of the immense total of tonnage is too sound to be jeopardized by wild claims that it is ready to haul heavy commodities—such as products of the forests and mines—in times of peace, across the face of the globe. It is expected that certain refinements of our present engine, propeller, and aerodynamic designs will be developed for more efficient airplane performance, thereby lessening operating costs. These factors, however, are limited, and it would not be safe to assume that they would bring the operating costs of aircraft down to compete with the lower classes of materials. Let us consider, for example, the l. c. l. freight field which averages about 4c a ton mile. As I said a moment ago, this traffic amounted to around 18 million tons carried on the Class I railroads in 1941. While this is 1½% of the total freight carried, it represents about 2,000 times as much as the total air express carried by all domestic airlines last year. If we were *able to compete on an economic basis*, and suppose we had an airplane with a payload of 16 tons, which cruised at 250 miles an hour, and assuming that we could fly each plane 3650 hours per year, it would take 620 of these planes to move the 18 million tons of l. c. l. freight. This, of course, does not take into account the rail express or mail traffic. Therefore, we should concern ourselves at the present with the planning of equipment on which the cost of operation would permit us to compete for these higher classes of surface freight, express and mail markets.

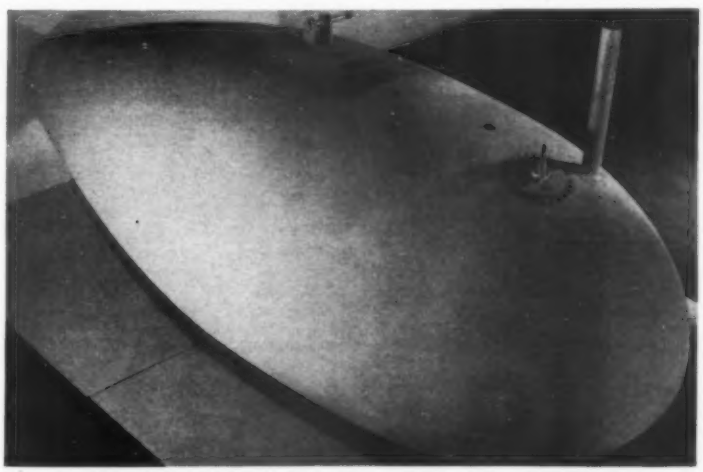
"An analysis of a market survey of the domestic operators which we recently made indicates that 83% of the carriers believe that cargo-carrying facilities should be considered a part of future passenger airplane design for domestic trunk line and primary connecting operations in the post war period. But . . . the war has forced us to extend the scope of our markets and has advanced our research and practical knowledge by some 10 years Consequently, many of these operators have expanded their conception of future activities to include trans-oceanic operations; and a number of the carriers have added that the process of rehabilitation and reconstruction in foreign countries and the re-establishment of those markets after the war would require a special cargo airplane in view of the necessity of speed in the delivery of essential foods—particularly perishable foods—and goods in great quantities suitable for airplane transportation. Although the surface competition could render a service at a lesser cost the speed element in the transport of such commodities would justify the premium involved by such operation.

"Further analysis of this survey showed that, as well, a combination passenger and cargo plane for the so-called 'off-line' or 'feeder line' service was wanted. From both the operators' and manufacturers' viewpoints this would seem to be a logical step in the development of this service, and it is possible that this plane could be used also for transportation inland in the isolated or normally inaccessible areas in foreign countries.

'Sharpest Tool'

"As we have pointed out, the operators' desire—lacking any experience index in the field of solely air cargo transportation—is for a combination passenger-cargo plane for domestic service. Although we can understand their reasoning in arriving at this conclusion, from studies which we have made, we are not entirely in agreement with this thinking for a combination type airplane in certain weight classifications. We believe that in order to attain the greatest efficiency—that is, the lowest ton-mile cost—we should use the sharpest tool to accomplish the particular job. And, in this case, we believe that ultimately the sharpest tool must be the exclusively cargo plane. Although we agree that a combination passenger and cargo plane would have many of the features which go to make up either low seat-mile cost or low ton-mile cost, we nevertheless believe that the basic advantages to be gained in efficient cargo operation can best be obtained in the preliminary design of an exclusively cargo plane. Many of the essential factors—such as stowage and handling facilities and their supplementary features—which go to serve for the efficient operation of cargo ships may not serve as the sharpest tool for the efficient operation of passenger airplanes, and vice versa: for example, the design necessary for increased payload and stowage, for additional hatches—all of which serve to lessen speed, may not be practical for passenger operation. Carrying this further, a great deal depends upon the nature of the routes; whether they are primarily large potential passenger or cargo territories. And, it may be that the peculiar requirements of the passengers on the one hand and those of the cargo on the other may differ greatly. For instance, it may be that the greater volume of passenger traffic desires to depart and arrive at its destination at hours most suitable to passenger requirements—that is from 5 P.M. to 9 P.M.—whereas it may be more advantageous for cargo to be picked up and delivered at the airport and depart at a later time, so long as it fits in with an early morning delivery, which might be anytime between 12 and 4 in the morning.

"In defense, then, of the operators' desire for an airplane which they feel most suited to the immediate post war needs, from the standpoint of size, our studies showed that in general the greater the size developed efficiently around any given horsepower, the lower the unit operating cost would be. Their reasoning for a large combination airplane is to accommodate the increased passenger business and, at the same time, get their feet wet, so to speak, in the cargo field. They do not expect that there will be a sufficient volume of business in the latter field at first—that is, not until the manifold problems of regular domestic cargo operations have been solved—to warrant the purchase of a separate cargo airplane. The problem is not only in refining the various aspects of the airplane to lessen transportation costs in order to compete with express and cargo markets but there are other indirect factors as well. A few of these problems, the solving of which would result in a lowering of rates, are a nation-wide pickup and delivery service, a more uniform method of stowage and trans-shipments, adequate handling facilities and the education of the public from the change of normal habits to that of shipping by air."



Plastic Auxiliary Tank: Vidal Research Corp. has announced this wood and plastic auxiliary airplane gas tank, which can be dropped in flight by pulling a trigger. Manufacturers in various sections of the country operating under the Vidal patents are planning to make these tanks ranging in size from 50 gallons to 160 gallons. "The engineering of the Vidal tank presented many interesting problems," the company states. "The patterning of veneers to make it leakproof, the creation of wooden molds around which the thin strips of veneer were laminated and the necessity of perfectly balanced baffles to check sloshing all had to be worked out with the thinnest possible shell commensurate with the load."

XUM

Froesch Urges Specially-Designed Freight Plane

(Continued from page 20)

must be at a point, roughly, 28% of the cabin length measured from the forward cabin wall. This seriously limits the available placement volume if the cargo is bulky.

The arrangement of cargo is at best a process requiring intelligent action in view of the variable weight, size and type of cargo pieces, besides the fact that such cargo may be bound for several destinations requiring placement in the compartment to allow sequence unloading.

Loading requires the coordinated effort of the plane crew, ground operations, loading personnel and, when in flight, communications to keep station delays due to loading and unloading at a minimum.

Seventh, we find that the lavatory compartment is in the wrong place as it is often difficult, in flight, to reach it from the pilot's cockpit with an airplane fully loaded with bulky materiel of low density.

Eighth, we find that no provisions are available for fire detecting and extinguishing in the passenger cabin converted to cargo compartment as hand fire extinguishers are the only requirements for passenger operation.

Heights Differ

Ninth, we find that each type of airplane has a different doorsill to ground height, necessitating lifting or lowering the cargo when loading from a standard motor truck platform height. This has resulted in serious delays, trip cancelations and inability to operate on schedule. For instance, the doorsill height from the ground is but 3'6" for the C-87, whereas it is 9'8" for the C-54, or a difference of 6'2" between the two.

It has necessitated the use of makeshift devices such as loading ramps to enable transfer from standard truck platform height.

Tenth, we find that the cross section of the fuselage, usually of circular or oval shape, does not permit maximum space utilization.

These are ten primary deficiencies found in the operation of converted passenger transport airplanes for air cargo service as well as in airplanes originally designed for passenger operation and factory modernized for cargo carrying.

While our primary purpose at the present time is to win the war, we must, nevertheless, look deeper and make plans for the future, or at least try to conceive what air transport operations are likely to be afterwards. Naturally, whatever changes are made by following this line of thought will also apply to military cargo airplanes with the exception, perhaps, of speed, which for military purposes must remain more important than operating cost.

In thinking of the progress of air transportation and its place in our national system, we must try to find its proper relationship with other available surface means. Obviously, we cannot hope to fly every traveler and carry every type of merchandise with maximum economy and must, therefore, segregate passengers and cargo according to purpose and distance of travel.

Fundamental Laws

Before we can tentatively set down operating requirements for airplanes designed basically for commercial air cargo operation, we must first determine just what are the fundamental laws which apply to the transportation of air cargo.

The principal service the air cargo operator has to offer to the shipper is the speedy and safe transportation of his products. He must furnish this service at a sufficiently low tariff to attract and continue to carry a large volume of traffic. Air express volume has been built in the past primarily on the demand for emergency and perishable shipments which could bear a rate premium and as such can never grow to a substantial size.

Our first consideration, therefore, should be lowest possible operating cost per ton mile. This is a necessity if we desire to obtain a large volume of business and compete with other means of express and freight transport which now have substantially lower rates per ton mile from door to door than we have been able to obtain with the airplane to date.

Will Fly Express

First-class rail express is moved at a cost to the shipper at an average of 10 to 12 cents per ton/mile and if this rate can be met, including pickup and delivery cost, there should be a large volume of business available for movement by air and including most commodities which now go by rail express.

We certainly cannot hope, nor expect to supplant existing means of surface transport, as at one time or another in the course of modern processing or fabrication of commodities or articles, practically all such means are utilized. The airplane will probably limit its service to the transportation of merchandise representing either a high density or volume cost such as expensive tools and vacuum tubes, thus becoming intermediate means of carrying finished products from factory to consumer with maximum expediency.

A 10 to 12 cent per ton/mile rate is not impossible if we judiciously interpret and apply our present knowledge of aerodynamics, improvements in structures and larger power plants to the design of strictly cargo carrying airplanes.

It is true that mileage from point to point is invariably lower by air and that the elimination of heavy packaging decreases cost of cargo preparation and promotes efficient utilization of the airplane, but still these advantages come far short of overcoming the differential between air and rail express tariffs.

We can possibly go further by exploring the field of LCL freight which might possibly be handled as second-class or deferred express, bearing a lower rate and used to increase the average load factor, thus reducing average ton/miles/hr. cost.

Glider Trains

At a later date we may conceive the use of cargo glider trains with takeoff and landing strips alongside factories simulating present railroad sidings. However, this discussion is limited to operating requirements of cargo airplanes only.

A cargo airplane should be a vehicle to carry merchandise not only at the lowest possible cost, but at the highest permissible speed. High speed is essential but if it is to be obtained purely by a reduction in cruising power loading, operating costs will be higher, since speed varies as the cube root to the horsepower. This being the case, tariffs would have to be raised and volume obtainable lowered.

For a given airplane, designed for a specific gross weight, and having a given wing loading, there is a power loading which is most economical. In other words, there is a balance between maximum payload and lowest cruising horsepower on one hand, and low power loading with reduced payload on the other.

. . .

Obviously, there is nothing to be gained if due to high speed cargo must wait several hours unloaded at destination, as might occur with a load of perishables having left the field of the evening before and arriving destination several hours after customary delivery time.

I fear to tread on the question of airplane size, except to mention that it must be remembered that airplanes permit higher ratio useful load to gross weight and greater range for a given load many airplane components detail weights do not increase proportionately to the gross weight. Airplane size at present is limited by available engines, although existing restriction may be removed with the conception of large planes requiring several years design and fabricate experimental prototypes. As a matter of fact, engines will need to be conceived and developed to permit lower fuel per ton mile and more miles per gallon or else air cargo expansion may find itself seriously curtailed especially for long range operations.

Cargo airplane size and economy cannot be predicated until a thorough analysis of the air express and freight market has been made. All we know is that air express is here to stay and that its volume will depend on the cost of the service to the shipper. Also, that freight will follow on the water any rate reduction which can be made to render its transport competitive with other means.

Low Price

Obviously, the sales price of a cargo airplane must be as low as possible because on the basis of modern experience, depreciation amounts to, roughly, 10% of direct flight costs.

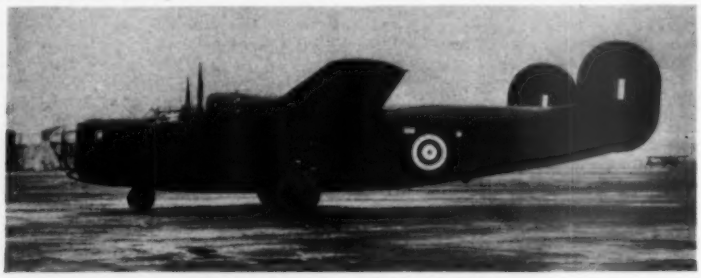
Generally speaking, the type of cargo airplane which appears to offer suitable points to a high wing monoplane motor with tricycle gear. For larger capacities and longer ranges a four-engine low wing might be considered superior.

Because of its simplicity, the single motor type is more economical and meets the most important operating requirements for the following reasons:

(1) It has the simplest power plant combination and meets the requirement for safe operation with reliability with least servicing and maintenance. Single engine performance must be sufficient to maintain a safe altitude over the highest obstacle to be negotiated.

(2) A high wing combination permits low fuselage and, therefore, low door height to ground, besides having ample wing to ground clearance to allow freedom of movement for ground vehicles without danger of hitting the wing. Furthermore, large propellers may make a low wing or mid-wing location almost

(Turn to page 27)



British Use Consolidated B-24s
Carries Trans-Atlantic Cargo, Passengers

XUM

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It is a responsibility, too—one that we have not...and shall not, bear lightly. Throughout our growth in Arizona's Valley of the Sun to one of the Nation's *largest* primary schools, we have worked constantly with the Army Air Force to develop safer, more efficient training. When Victory is won, these skills will be turned again to peacetime tasks.

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ays Structural Materials Von't Limit Cargo Plane Size

TRUCTURES and the materials used therein are not w and do not appear in the ture to be a limiting factor the size of aircraft, accordg to H. D. Hoekstra of the vil Aeronautics Administran.

Hoekstra told the Society of Autotive Engineers' air cargo enginng meeting in Chicago on Dec. hat cargo airplanes can be fabrited from any of the presently own and commonly employed ructural materials.

Aluminum alloy structures will obably continue as a leader, stainss steel is a "definite contender," gnesium alloys have "considerle promise," but wood construction obably will continue to be "of mewhat lower rank," the speaker id.

He called "conservative" the conusions reached a few years ago Dr. Roxbee Cox that a plane of 0,000 lbs. gross weight was quite asible and that a design of 11/3 illion pounds was entirely possible.

Discussing new structural materls, Hoekstra said:

New Materials

"The tremendous amount of research w underway in materials may well ncover new types of great merit. Natally, substantial improvement in the n, aluminum and magnesium alloys ppears most likely but the following ndom thoughts may be of interest.

Glass has a density close to that of agnesium. Values of 100,000 psi comression have been obtained and tensile rengths of 300,000 psi have been reorded for small diameter glass fibers. n almost utopian product would reult if these optimum properties could e combined into a usable material, ossibly through the use of plastics s a bonding agent. One glass product eady put to use is glass fabric. Exerimentally it has been used as a wing overing material. If a satisfactory ope or its equivalent to tighten the over is obtained, widespread use would most certainly follow. Fabric meetng Grade A strength values weighs 2 z/yd² instead of 4+ and has, of course, uch better fire and deterioration reistant properties.

Beryllium

Beryllium as a direct structural maerial continues to be as Dr. Tuckerman so aptly put it a few years ago "a tantalizing dream." Its properties, e might add, also seem to have some f the elusiveness of dreams. Modulus E) values varying between 27 and 41 illion psi have been quoted by various esearchers. Reported values of ultiate tensile strength and hardness lso vary. However, a material with he density of magnesium and the modulus of steel warrants and is reeiving considerable study and experimentation. The most likely development is an alloy with aluminum or magnesium having the principal emphasis directed to increasing the modulus of the latter metals. If this objective is attained in a commercially able fashion, a step of major proportions in aviation progress will have been made . . .

On the basis of some rather approximate but fundamentally sound assumptions, it can be shown that the empty weight of a DC-3 could be reduced not less than 2,000 pounds, if such a material were used."

The speaker's detailed conclusions follow:

"Cargo airplane can be fabricated from any of the presently known and commonly employed structural materials.

Aluminum Alloys

Aluminum alloy structures will probably continue as a leader because of its good strength to weight ratio and the vast accumulation of 'know how' both in manufacturing and in operational maintenance.

Stainless steel is, however, a definite contender, particularly under operational conditions involving exposure to severe corrosive effects and also in large aircraft where the high allowable stresses of the material and the simplicity of spot welding techniques reduce the bulk of members and attachment fittings. It, along with other ferrous alloys, will continue to be preeminent where provision must be made against fire hazard such as, for example, structural members in the vicinity of power plant installations.

The magnesium alloys appear to have considerable promise if the problem of corrosion and workability is adequately solved.

Wood construction probably will continue to be of somewhat lower rank, particularly for use in large cargo aircraft unless smart engineering and outstanding new developments in fabrication processes and protection provide advances not predictable now.

In the plastics phase, developments are of such varied nature that predictions probably would be wide of the mark; however, it does hold considerable promise.

Structures and the materials used therein are not now and do not appear in the future to be a limiting factor in the size of aircraft."

Studebaker Cyclone: An Air Corps base worker unpacks a new Wright Cyclone engine just in from Studebaker's Aviation Division in Indiana.

Froesch

(Continued from page 24)

mandatory for any cargo airplane up to a given size.

(3) The use of a tricycle landing gear is necessary to obtain a level loading floor and ease of loading and unloading.

In practically all landings, the pilot usually flares the airplane more than is necessary, with resultant higher vertical velocity upon impact on the runway unless lift is retained by high landing speed.

From an operational viewpoint, the elimination of the landing flare-out necessary with the conventional type of landing gear is an advantage as with instrument landing in bad weather the airplane must be virtually flown to the ground.

One of the basic characteristics of cargo airplanes should be the largest possible center of gravity travel to eliminate critical load distribution.

The cross-section of the cargo compartment should be square or rectangular in section for maximum space utilization and cargo hold-down anchor location simplification. There should be no sharp corners which might be a source of personnel hazard, besides being dirt collectors. The minimum height of the compartment should be six feet six inches to allow walking throughout its entire length erectly.

There should be at least one large loading door on the left side, together with a smaller size one for crew entrance and exit at the front end of the same side. Preferably, and I repeat what I mentioned earlier, another large loading door should be located on the opposite side somewhat ahead of the left loading door to enable loading and unloading at the same time. The relative location of these doors lengthwise to the cargo compartment could readily be determined from actual experience with a mock-up test.

The doors should be designed to present minimum obstruction to loading and unloading. Flush mounted sliding doors would best meet this requirement.

Cargo compartment floors should be on the same level to expedite loading and eliminate steps as a source of accidents. Such flooring should be of sufficient strength to take a high load concentration and the entrance door region should be designed to take a load concentration equal to the heaviest piece expected to be carried. This may require a good guess as about 90% of all express packages are shipped in corrugated boxes or light wooden crates which can be carried by one man. However, the remaining 10% may include aircraft engines weighing up to 3,500 or 4,000 lbs. as well as other pieces of heavy machinery which have been carried in the past as emergency shipments.

From the economic point of view it does not appear logical to increase the empty weight of every cargo airplane of a fleet to handle this 10% of cargo and the solution may be that only a few such cargo airplanes will be sufficiently strengthened to take what is virtually heavy freight.

Cargo space volume for any given airplane size should be based on an average express or freight density.

Rail freight averages 32 lbs. per cu. ft. and rail express about 12 lbs. per cu. ft., while airmail averages nine pounds per cu. ft. If we assume that improvements in packaging can reduce express tare 20%, we arrive at an air express density of approximately nine and one half pounds per cu. ft.

Allowing for unusable space plus a certain amount of space in the region of the loading door which should probably be kept clear at all times, we can set down a density volume ratio of eight to nine pounds per cu. ft. as design criterion in determining the size of the cargo compartment.

Cargo stowage means should be light and efficient, suitable cargo tie-down devices should be provided flush-mounted and built integrally with the floor and side wall structures. Provisions should be made for a flexible segregation of the cargo compartment space into bins and sections, such as may be obtained by the use of movable stanchions with flexible partitions such as chain doors, which are light. The side walls up to a minimum height of 36 inches from the floor should be protected by means of suitable removable panels, fabricated perhaps from laminated plastic having varying thickness from the ground to their maximum height to secure least weight for maximum protection.

Only sufficient windows should be incorporated to give satisfactory light and these could be portholes. Cargo compartment lighting must be protected against damage. Such lighting should be adequate as much work will be done at night . . .

Cockpit arrangement should include space for cargo handler station. The cargo handler's duties would be to keep track of all cargo pieces, check and prepare cargo manifest, check destination of cargo, supervise loading and unloading, check the CG location of the cargo for balance, as well as any other "in flight" duties which may be required.

A small cargo compartment should be provided and readily accessible from the cockpit for the safekeeping of valuables. This compartment should be close to the cargo handler's station as it would be his responsibility to care for such valuables.

Among the miscellaneous operating requirements can be cited adequate fire protection for both power plant and cargo. For the latter, it is believed that a smoke detector

(Turn to page 36)

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Fortnightly Review

(Continued from page 1)

Chamber of Commerce. The other is John E. P. Morgan, representative of the lightplane group and principal founder of Grasshoppers, Inc., a humorous organization with a serious objective which caught hold in the national capital recently and is spreading throughout the country. Others such as Richard Depew, of Taylorcraft Aviation Corp., H. A. Schaffer, and William T. Piper, of Piper Aircraft Corp., have done their share of keeping under steam a great and needed phase of the aviation industry.

Passenger Fares

OFFICIAL quarters in Washington have made it clear to the airlines that a reduction in passenger fares would be most welcome at this time. The implication is likewise clear that unless the industry takes the initiative in reducing fares, government action toward that end is likely in due course.

Fare reductions would appear to be worthy of immediate study. This would appear to be an opportune time to initiate lower fares at a time when virtually all prices and rates are tending upwards. Inevitably the five-cent-a-mile average must come down step by step and a reasonable reduction at this time would be far preferable to a forced reduction of a greater size.

From a public relations angle, *industry* initiative would be highly beneficial. A fare reduction order from the *government* would have the reverse effect. From another angle, excess profits taxation will eat heavily into the industry this year; passing some of this on to the airline rider in the form of lower fares would seem to be desirable. In any event there is no doubt of the splendid effect on the public of an industry-wide fare reduc especially in preference to newspaper headlines telling of a ernment order. Lower fares are inevitable. Of the two met of reducing fares, the right one is obvious.

Asleep Again

AN ATTORNEY for the Post Office Department by the m of William C. O'Brien told the Civil Aeronautics Board oral argument Dec. 4 that the .3 mill air mail rate set by the C tor Eastern Air Lines is "excessive" and should be reduced .147 mill. When one defends reasonable rates these days l always subject to the accusation of defending reactionary business, but we submit that Mr. O'Brien's pleas sound mi reactionary in themselves and have a somewhat malodo scent of pre-war unpreparedness. Failure of government ag cies to follow out the clear mandate of Congress to build u strong airline network for commerce, for the mails and for tional defense, has had its costly price in the acute shortag transport planes in the war to date. Judging from Mr. O'Bri singularly shortsighted pleas, the Post Office Department wants to do its share to put the airlines behind the eight ball post-war development, and behind the parade of internati air transportation when the fighting ceases. Will these cloist government servants ever recognize the necessity for acting the interests of the public and the nation, or will they cont to muddle along in narrow political grooves to the detrimen our national welfare?

Mail First in Canada

AIR MAIL is being "kicked off" airplanes in the United St because it is not afforded a high priority rating. To be s most of the mail goes through without delay, but priority exp and priority passengers do take precedence over the mail.

In Canada the opposite is true. Air mail has top priority. even an Army General can dislodge it. Even urgent exp must follow. Canada considers nothing more important t speedy mail delivery—more so *during* the war than before. Th have been instances of airplanes flying with no payload o than mail; everything else had to wait.

We submit Canada's procedure to the United States. In C ada the Post Office Department is a powerful voice. In United States our Post Office Department acquiesced to pres The answer is obvious.

A Commendable Report

WHILE we are not in a position to judge the merits of liq cooled aircraft engines, we do commend the Allison En Division of General Motors for its report to newspapermen the fundamentals of aircraft engine design. It is remarkably f of bias despite the blistering criticism leveled at Allison f numerous sources. It is a useful type of report for which writers are thankful, a masterpiece of public relations.

Rickenbacker Back

EVERYONE who knew Eddie Rickenbacker seemed to k that he would turn up sooner or later. It was only a qu tion of when, where and how he would be found. Neverthel there is no discounting the miracle of his being saved. It coul have happened to anyone else. We're mighty glad he's back.

Howard C. Knotts

THE death at the age of forty-seven years of Howard Knotts on November 23 removes from aviation one of finest disciples. Howard was beloved by all who knew h His brilliant legal mind contributed much to every type flying in the United States. Few who did not know of World War I injuries were aware of the heroic personal physi effort he had been making to "keep going." He will be tr missed.

What Others Say

PITTSURGH POST-GAZETTE—"It always pleases the people when Eddie Rickenbacker returns to spoil a nice obituary."

AL WILLIAMS—"We've got to have peace after the war and a practicable system for maintaining peace safely based only upon a policeman's club for enforcing it. Airpower has revolutionized our lives and this war. Why not continue the revolution into peacetime by making our world airline system a policeman earning his keep?"

NEW YORK TIMES—"The course of the battle of the Pacific has demonstrated abundantly both the value and the vulnerability of the aircraft carrier as a fleet unit. Its striking power through the medium of its fighter and torpedo planes has been shown again and again. Its number one standing as a concentrated target, itself highly vulnerable to torpedo attack both from the air and by submarine, has led to heavy losses on our side as well as on Japan's. Obviously, our own program of new carrier construction should be pushed with all possible speed. But would it not be possible to supplement our surface carriers by the immediate construction of rigid airships large enough to act themselves as carriers of combat aircraft? . . . The cost of large rigid airships could be brought down, by building 10 or 20 at a time, to a point where a score could be constructed for the cost of a single surface carrier . . . The value of the rigid airship in the present conflict would seem to deserve thorough investigation."

WASHINGTON EVENING STAR—" 'Pensacola Admiral' is a term coined in derogation of the older officers who earned their wings at Pensacola merely as an added accomplishment, after service in other branches of the Navy. Those fine youngsters, the fighting pilots, scorning anything they see from a cockpit, were not always willing to admit 'Pensacola Admirals' as blood brothers in an exclusive fraternity. Admiral King is a 'Pensacola Admiral' who won his wings at the ripe old age of 49 . . . Another 'Pensacola Admiral' is the Navy's hero of the day—Vice Admiral William Frederick Halsey Jr., commanding the naval forces in the South Pacific . . . These 'Pensacola Admirals' are airmen. But they are also sailors. And if our Navy is winning battles with 'Pensacola Admirals' on the bridge, it is winning battles because as airmen the 'Pensacola Admirals' understand the part that other Navy arms must play. The younger pilots, who have spent most of their Navy lives in the air, are being rapidly advanced to higher rank—as they deserve to be. The time may come in the Navy when no man can hope to be an admiral who cannot add 'Pensacola' to his rank. For our admirals must know airships. But they must know other ships as well."

Bookshelf

THE MAN BEHIND THE FLIGHT. By Asen Jordanoff. 300 pp. Illustrated profusely. Harper & Bros., 49 E. 33d St., New York City. $3.50.

The author of *Your Wings* and *Through the Overcast* has brought forth another popular book, this time directed into one particular vocational path of aviation. This work is described as "a ground course for aviation mechanics and airmen," but a more complete description would indicate the book's usefulness to "the men who are building our airplanes and keeping them in flight."

There are more than 300 exact drawings. The text tells the reader how to read mechanical drawings and blueprints easily and accurately, and provides some of the fundamental facts about physics, mechanics, hydraulics and electricity. At the end is a compact history of aviation, and 31 pages of photographs of important airplanes and personalities since 1903. There is distinctly less commercialism in this new Jordanoff book, which is in its favor. It should do as well in sales as several of its predecessors, for, after all, there are 10 men on the ground to every one in the air and much more popularized and simple reading material is needed for those who must keep the planes in first-class shape.

VISIBILITY UNLIMITED, by Ernest G. Vetter, Lt., U.S.N.R. 300 Illustrations. Introduction by George Russell Harrison, Dean of Science, M.I.T., Chairman of Instrument Section, Office of Scientific Research and Development, O.E.M. William Morrow and Co., Inc., 386 4th Ave., New York, N. Y. 350 pp.

Vetter

This text is written by an aviator and teacher whose job is training Navy flyers and written for student pilots taking preflight courses. It authoritatively and comprehensively covers aspects of meteorology and navigation as they are taught in the basic training of U.S. Army and Navy, and provides the instruction required for CAA certificates.

Starting with an explanation of the atmosphere surrounding the earth, the text takes the reader, step by logical step, to the planning and execution of an actual flight. The book concludes with a series of flights worked out through the use of principles the reader has learned.

Obituary

Howard C. Knotts

Howard Clayton Knotts, 47, well-known authority on aviation law, died in Springfield, Ill., on Nov. 23.

Mr. Knotts was born in Girard, Ill., studied at Blackburn College, later graduating from Knox College in 1916. The following year he was commissioned a second lieutenant and went overseas as a pilot with the 17th Aero Squadron. He was wounded twice—wounds from which he never fully recovered—and was officially credited with shooting down eight enemy planes.

He received the Distinguished Service Cross, the Purple Heart with oak leaf cluster, Silver Star and the British Flying Cross.

In 1921, Mr. Knotts obtained his law degree at Harvard University. After serving on the staff of the United States Attorney for the Southern District of Illinois, he entered the law firm of Knotts and Knotts in 1923. In 1933, he became a member of the firm of Knotts and Dobbs, Springfield.

Since 1937 he had edited *The Journal of Air Law and Commerce*, published by the Air Law Institute of the Northwestern University School of Law. He had lectured on air transportation at the university's commerce school and on public utility at the law school.

Mr. Knotts had served as aviation supervisor of the Illinois Commerce Commission since 1931, and was well known in Washington as a consulting expert to the Bureau of Air Commerce, the Department of Commerce and the Civil Aeronautics Authority.

He was counsel for the American Association of Airport Executives and co-counsel for the National Association of State Aviation Officials. A member of the Quiet Birdmen, he had more than 1,000 hours flying time.

A. N. Parker

Alton N. Parker, 47, pilot with the intercontinental division of Transcontinental and Western Air, Inc., died of natural causes in Miami, Fla., Nov. 30, according to press reports. Parker had been with TWA since that line began air mail operations in 1930, and was said to have flown more than 2,000,000 miles in his total flying experience. He was a major in the Marine Corps Reserve.

When Admiral Richard E. Byrd made his expeditions to the North Pole region in 1926, and to the South Pole in 1928, Parker accompanied the parties as a flier. In 1930, he received the Distinguished Flying Cross for his performance as pilot for Admiral Byrd on a flight in 1929 which led to the discovery of the Edsel Ford range of mountains and the eastern boundary of the Ross sea.

C. W. Frederick

Charles W. Frederick, 72, research scientist for the Eastman Kodak Co., Rochester, N. Y., died Nov. 29. Frederick pioneered in the design of aerial photography lenses. During the last three years he had evolved a new type of aerial lens now being used by U. S. armed forces. In World War I he designed some of the first aerial lenses used for military photography.

Gen. Duncan Missing After Forced Landing

Brig. Gen. Asa N. Duncan, 50, Chief of Air Staff in the European Theater of Operations, has been missing since Nov. 17. He was on a flight from England to North Africa, War Dept. has announced. Duncan's plane was said to have been forced down off the northern coast of France. No information has been received as to whether any of the passengers survived.

Duncan, rated a command pilot and combat observer, became a Brigadier General early this year. He formerly served as Chief of the Personnel Division in the Office of the Chief of Air Corps.

Big Air Future Won't Ruin Rails—Patterso

Aviation Will Revolutionize Social Views

THE future of air transportation is so great that it will revolutionize practically every social and economic viewpoint and practice, and this future will be realized without serious inroads upon steamship lines or railroads, W. A. Patterson, president of United Air Lines, told the National Industrial Conference Board in New York on Nov. 24.

In an unusual and significant speech, Patterson, repeating assertions made by Assistant Secretary of War Lovett and others that postwar air transport will augment rather than supplant surface transportation, warned against "over enthusiastic predictions" of the airplane's future influence.

He added that air transport can be considered as a "sales department" for the whole transportation industry, "promoting traffic that will redound to the benefit of all forms of carriers . . ."

A partial text of Mr. Patterson's remarks follow:

Today there is considerable discussion of the postwar future of the airplane, and public opinion seems to range all the way from the feeling the airplane is "here to stay" to the unbridled feeling that the airplane will drive other forms of transportation out of business.

It seems only a few years ago the value of the airplane to national defense and its ultimate place in our social and economic system was a matter of considerable question. Actually, 15 years ago public confidence in and acceptance of the airplane was at its lowest ebb.

'Extreme Enthusiasm'

Now, however, the pendulum of public opinion seems to have swung from that extreme to the other. Those of us who have had confidence in the future of aviation in years gone by now see that confidence supported by actual performance. As an instrument of destruction and as a medium for the transport of men and materials of war, the airplane has become tremendously important. Public opinion has reacted quickly to this situation and is now headed in the direction of extreme enthusiasm over the postwar future of the airplane.

As one who has been active in aviation for 15 years, I have great confidence in the postwar future of aviation. I firmly believe in the peacetime to come that the airplane will occupy an important place in the international scheme of transport and communications of our new world. On the other hand, I feel that this picture is being distorted, perhaps in a harmful way, by overenthusiastic predictions of the influence of the airplane in the postwar world.

Clarify Perspective

My purpose in these remarks is to rationalize these statements about the part the airplane will play in our future lives, as I feel it is important to clarify our present perspective of postwar aviation. I should like to combine this objective with a thorough discussion of my own appraisal of the healthy future which I believe aviation will enjoy . . .

We all have great confidence in the future of our business and we have all made enthusiastic statements in regard to its future development. I, for one, have stated on many occasions that the airplane is going to revolutionize our social and economic habits as we have known them to be in the past, and as a result this will have the effect of changing our methods of merchandising and distribution. I still believe this firmly.

Enthusiasm is the greatest asset any management can possess in promoting the development of its business. However, overenthusiasm can lead to failure in expectations. When statements are made that our older forms of transportation, the railroads and steamship lines, are doomed, such statements cannot be supported by facts.

Will Augment

Air transportation will augment surface transportation, not supplant it. Surface transportation will progress as a result of air transport's development, rather than be retarded by it. . .

The first job facing all of us is to win this war. We all know the outstanding job being done by all forms of transportation in our war effort. The service being performed by the railroads, for example, is s most spectacular performance. . .

The railroads and steamship companies, who are aroused by the many enthusiastic statements regarding the future of air transportation, are studying the postwar problem to see if they too should take to the air. This is a question that will be decided on the facts developed in any study and will, of course, be influenced to a great extent by government policy. We do know that all studies made prior to the war do not disclose practices or facilities existing in common on both the airlines and railroads that would bring about any economy as a result of consolidation. The one and only common objective is the desire for business. We will definitely be competitive for certain types of passenger business and certain types of express. The gains the railroads will achieve in freight traffic which will be created by the airplane will more than offset their loss of passenger business to the airlines.

Relative Costs

Let us examine the relative cost of freight transportation by surface means and by air. These comparative costs which I will give you are the result of much research and study by our Statistical and Economic Research Department to find some of the answers ourselves. They are, of course, based on the operating costs of present airline equipment, such as is now in commerical operation in this country.

First let us compare the freight train with the cargo airplane on the basis of normal peacetime conditions.

The average freight train would consist of 50 cars, 30 of them loaded with 26 tons of freight each, and 20 of them empty. Such a freight train, based on actual railroad statistics for the year 1940, would carry a total of 780 tons. Operated between Chicago and San Francisco, it would give sixth morning delivery and could make two round trips in a month's t

Therefore, every month it w deliver a total of 1,560 tons o way between those two points. oil burning locomotive pulling train would consume 170,000 lons of fuel oil during the mo which at two cents a gallon w cost $3,400. The operating on such a freight train would m ber five men, and an equival of four crews or 20 men would required to keep the train runn Their total pay would be appro mately $5,000 for the month. total operating cost of the tr based on 1940 railroad experie would amount to $50,000 for month, which represents the of moving 1,560 tons by rail f Chicago to San Francisco, and other 1,560 tons from San Fra cisco to Chicago during the inter of one month, or two round tr

626 Trips

Now, let us do the same job airplane, using the familiar Ma liner (DC-3) type of equipme which is now in use on our line, converting it to small cargo-ty airplanes. The average lift capacity of such an airplane wou permit it to nibble in small bites only 2¼ tons each at the 1,560-t pile of cargo moved by the freig train in one month's time. would take 626 bites, or 626 airpla round trips between Chicago a San Francisco to do the same j that the freight train did in t round trips. This represents 2,50 000 miles of flying compared to t 880 freight train miles.

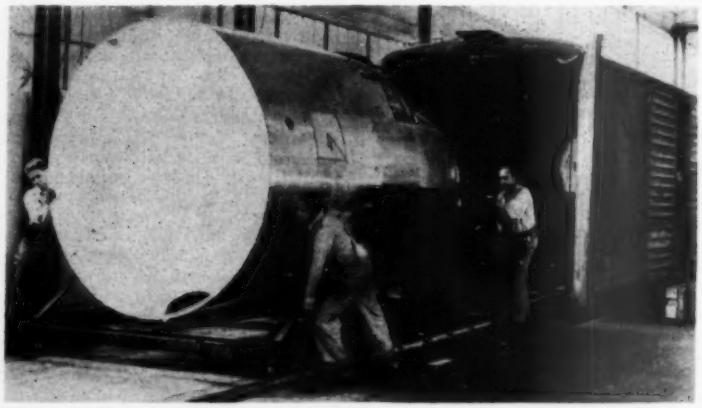
A single airplane could not ma that many round trips betwee Chicago and San Francisco in month's time. Normal operati experience would indicate 11 rou trips per month per ailplane as th average. On this basis 57 airplane would be required to do the job the freight train. During th month these airplanes would co sume 1,500,000 gallons of gasoli compared to the 170,000 gallons fuel used by the train. The ga oline would cost a total of $200,0 compared to a cost of $3,400 f the fuel used by the train. Fou hundred pilots would be needed t fly the airplanes as against 20 cre members to keep the train running The pilots would receive a total $200,000 in pay for the month whil the payroll for the train crew mem bers would amount to $5,000.

35 Times

Based on recorded experience, th total operating costs of the air planes would amount to $1,750,00 during the month while the freight train costs would total $50,000. Th airplane operation would therefor cost 35 times as much as the freight train.

What has the airplane contributed to the economic picture in return for this large additional expenditure? Speed? In both examples the same number of tons have been moved the same distance in the same length of time—the

(Turn to page 38)



Bomber Delivery: In special box cars, the Chicago, Burlington & Quincy Railroad delivers nose sections for Martin bombers to Glenn L. Martin's Nebraska assembly plant. The roofs of a number of box cars were raised 26 inches to accommodate airplane parts. W. A. Patterson says that aviation's big future will be realized without serious inroads upon the railroads.

Do you machine aluminum?

Gulf Cut-Aid will help you get higher production speeds, better finishes and longer tool life!

IN plant after plant, Gulf Cut-Aid is demonstrating its superiority as a cutting fluid for aluminum. Here are typical results with this revolutionary new Gulf product:

1. *Operation*—turning aluminum castings, ⅛" cut
   Result, using
   Gulf Cut-Aid—20% increase in production, 75% better finish (est.), longer tool life
2. *Operation*—tapping a ¾" diameter hole in a ¼" thick instrument cover plate
   Problem—1 part in 20 rejected due to cracking
   Result, using
   Gulf Cut-Aid—over 500 cover plates tapped without a reject.

Undercutting the valve seat on an aluminum alloy cylinder head in the plant of a prominent aircraft engine manufacturer.

In addition to its function as the ideal cutting fluid for aluminum, Gulf Cut-Aid has another important function — it is an effective energizer for other cutting oils, regardless of type or viscosity. Blended in varying proportions depending upon the various requirements of the job, the use of Gulf Cut-Aid with other cutting oils results in improved finish or longer tool life, or both.

Call in a Gulf service engineer today and let him demonstrate — in your plant — how Gulf Cut-Aid and other Gulf quality cutting oils can help improve your machining practice. Gulf Oil Corporation, Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

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Please send me, without obligation, a copy of the new booklet, "Gulf Cutting Oils," which includes a 24-page Machining Guide.

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Who are these Men and Women?

They are the Experimental Department personnel who built the world's largest flying boat—the Navy's new Martin Mars . . . What have they done? They have put in the air a flying giant that points the way toward winning the war and winning the peace . . . Inevitably, great cargoes of men, munitions and supplies must be carried by air before the battle is won. Inevitably, fleets of huge ships will stem from such pioneering as this; ships which will transform the face of war . . . And beyond war lies the peace—where air commerce will move peoples and their products, will cement new friendships and help bury old hates, suspicions and jealousies. World peace will be built on world understanding made possible by air-commerce . . . What have these men and women done at Martin's? They have done more than build a great airplane. They have helped America take a new step toward Victory and World Peace.

THE GLENN L. MARTIN COMPANY, BALTIMORE, MARYLAND, U. S. A.

Martin AIRCRAFT

Builders of Dependable Aircraft Since 1909

Airline Personnel

Wilson Cantwell Phinney Pearson

In the Services

Fred M. Glass, former attorney for American, has been promoted from ptain to major in the Air Transport Command.

Francis Butler, former attorney for Northwest, has been promoted from jor to lieutenant colonel in ATC.

Hubert Schneider, former attorney for Braniff, has been promoted from ptain to major in ATC.

Capt. Joe Letzkus, former TWA district traffic manager in Kansas City, s been given a special assignment by ATC. He was serving as priority ficer in Kansas City.

Former TWA Captains **Harry Campbell** and **Cliff Abbott** are now lieu- nants based at the AAF combat crew school at Smyrna, Tenn.

Sales and Traffic

Martin J. Foley has succeeded **Leslie A. Collins** as United's district ffic manager at Montreal. Collins is on leave of absence to accept a mmission in the administration branch of the Royal Canadian Air rce.

Gordon B. Logan is United's acting district traffic manager in Cleve- nd, replacing **D. B. Wilson**, commissioned a first lieutenant in Naval r Transport.

Robert T. Phinney has been named Braniff's Chicago district traffic nager, replacing **Tom Fagan**, who has resigned to accept a Navy mmission.

I. E. Carver has been promoted by United to district superintendent of servations service in New York. He succeeds **W. H. Miller**, who takes new duties with the company's personnel department. **W. G. Gentry**, rmer senior agent in Los Angeles, has become assistant district superin- ndent of reservations in NY.

Raoul H. Nehr has been appointed traffic representative in Newark r American.

Operations

H. E. Sherwood is American's new air mail-express-freight representa- e in New York, succeeding **Girard M. Curry**, who has assumed duties eastern superintendent of air mail-express-freight.

Capt. Claude "Skip" Sterling, Chicago & Southern million-mile pilot, s resigned to become chief pilot and assistant operations manager for e Willow Run plant of Ford Motor Co.

Clifford S. Pearson is United's new cargo supervisor for the Denver- hicago-New York territory.

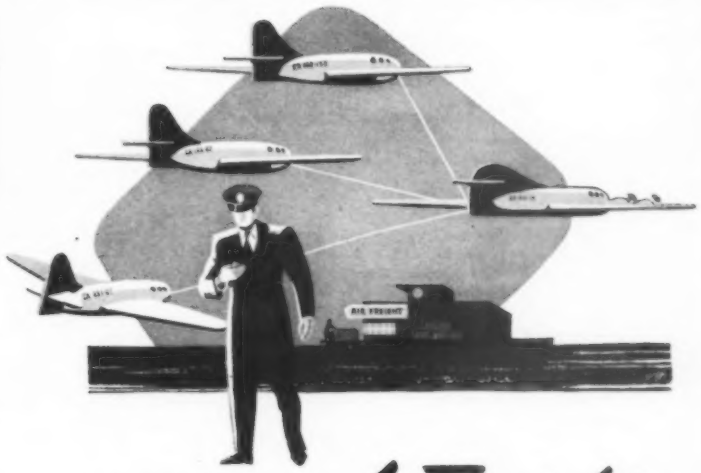
Miscellaneous

Russell Cantwell has resigned as director of the Kansas City Chamber Commerce's aviation department to join TWA as executive assistant E. Lee Talman, vice president and treasurer.

John A. Nooney has been named treasurer and **Robert H. Bolander, Jr.** cting general counsel of Chicago & Southern. Both will assume duties **Amos Culbert**, vice president-general counsel, who has joined American vice president-properties.

Edward C. Schulz has been appointed director of Chicago & Southern's wly-formed personnel department.

THE TOMORROW YOU'RE FIGHTING FOR!



SHIFTING Air Freight AT GREENVILLE... IN 1949

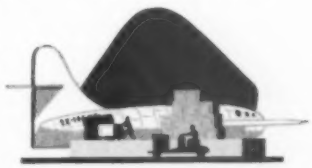
• The 4800 horsepower tug plane cuts off No. 3 glider ten miles back to soar for a landing unassisted ...then swoops down over the village airport and, without stopping, smoothly fishes another winged box car into the air, on its way to market.

• The days of '49 will be bonanza days again...rich in new developments...with every village a world port, only an airline hop, skip or jump from every other "Greenville" in the world.

• Dream stuff? No. It's possible with TODAY'S developments.* Only Hitler and Hirohito stand in the way. So, first we must fight to remove these madmen.

• Every one of us has a special battle station. Western Air Lines is flying military cargo planes for the Air Transport Command...plus the civilian job of speeding essential mail, passengers and express with its scheduled airline service.

*By use of cargo gliders, a transport can tow much more than it can lift. Gliders can now be released and picked up in flight without stopping.



WESTERN AIR LINES

America's Pioneer Airline

General Offices: Lockheed Air Terminal, Burbank, California

Paul E. Richter Called by Navy

Paul E. Richter, executive vice president of TWA, has been called to active duty by the U. S. Navy.

Richter, a lieutenant commander in the U. S. Naval Reserve, will report Jan. 4 to the Chief of Naval Operations in Washington for assignment to the Naval Air Transport Service. He has been granted a leave of absence by TWA.

Richter

His call to active duty breaks up temporarily his association with Jack Frye, TWA president. This association, which began in 1924 shortly after Richter learned to fly, has been one of the longest in the airline industry. Richter and Frye first formed Aero Corporation of California, and two years later organized Standard Airlines. The two companies were absorbed by Western Air Express, and with the formation of TWA, Richter was successively superintendent of operations, vice president-operations, and then executive vice president and director. He has also served as secretary of the company.

5,955-Mile Feeder Network Sought by Western Air

A 5,955 mile network of feeder-pickup routes covering 81 cities in eight states is being sought from the Civil Aeronautics Board by Western Air Lines.

The routes are designed to tie in important cities adjacent to the company's present system, according to Leo Dwerlkotte, executive vice president. States covered would be Montana, Idaho, Utah, Colorado, Arizona, Nevada, Washington and California.

"It is too early in the picture yet," said Dwerlkotte, "to know exactly the type of aircraft equipment to be used but it will be consistent with the present level of air transport operation. Other cities may be added . . . as the demand becomes apparent in the post-war period.

"The whole airline industry is devoting its entire energies to aiding the war effort and it is impossible to suggest an exact time in the future when the economic life of each community will feel the stimulus of this airline activity. Western Air intends to provide this service as soon as the . . . Board can clear away the difficulties of war-time operation and again devote its energy to constructive aviation development."

UAL Moves School

United Air Lines has transferred its pilot training school from Cheyenne to Denver. George I. Myers is superintendent.

Eastern's .3 Mill Mail Rate "Excessive" Post Office Claims

The .3 mill air mail rate set by the Civil Aeronautics Board for Eastern Air Lines is "excessive" and should be reduced to .147 mill, according to William C. O'Brien, attorney for the Post Office Dept.

Appearing in oral argument before the Board, O'Brien also contended that from Dec. 1, 1939 to Jan. 1, 1942, EAL should have received only 5c per mile, and that the PO should be allowed to recapture the company's "excess" earnings. The recent CAB decision ruled that past "excess" earnings would not be subject to recapture.

Discussing the retroactive period, O'Brien referred to the Board's belief that when the war ends there will be a sudden need for capital to enable the airlines to expand.

"These predictions as to what will happen in the future are certainly based on conjecture and not upon any experience data with respect to air travel for there was none prior to the last war," he said. "At all events, there is no reliable evidence that Eastern will suffer any lack of funds from current revenues when the time comes to purchase new equipment."

Pointing out that CAB placed no restriction on the use to which EAL may put the "excess" earnings, O'Brien continued: "What will take place at the end of the war no man knows. That there will be a lull in all peacetime activities as there has been after every war is to be expected. That there will be no immediate demand for expansion of service is even more likely than the sudden demand which the carriers and the Board envision.

"That excellent aircraft capable of being converted to commercial uses will be available at rock bottom prices is certain just as after the last war supplies and equipment which during the conflict were at a premium were practically given away . . .

"Is Eastern Air Lines to retain its excess earnings of two and one-half million dollars or more for say 10 years and to be paid a high rate of return upon it by the Post Office Dept? . . . There is not sufficient evidence in the record to support a conclusion that Eastern will ever suffer from lack of funds . . ."

Turning to the future, O'Brien said that a .3 mill rate would produce a profit of 69.6% on that portion of EAL's investment allocated to mail services by the Board's opinion, namely, $1,078,647. O'Brien, however, stated that the $1,078,647 contains excess working capital or idle funds largely derived from the "excess" profits. "The proper investment base upon which to calculate the profit . . . would be $395,474," he said. "Upon this basis the carrier would secure a return of around 150% . . .

"A rate of .147 mill . . . upon a service of 4,463,700,000 pound miles will yield a return of 10% net after taxes upon an allocated investment base of $395,474. A return of .147 mill . . . is equal to 5.52c per airway revenue mile. The .3 mill figure proposed by the Board . . . is equal to 11.3c per revenue mile, figuring 11,854,692 revenue miles annually. The .147 mill . . . rate will yield 21.12% overall profit including commercial revenues after taxes."

Smythe Gambrell, attorney for EAL, told the Board that although the EAL rate case is now in its fourth year, the PO has shown no serious interest until now.

The PO, he continued, is making almost 100% profit on the EAL mail account. Using EAL's 1935 mail rate as an index of 100, Gambrell said that this figure sank to 41 in 1941 and to 20.5 under the new rate.

"The Post Office should not be allowed to forever dabble in the rate-making process," he stated. When urging lower rates, the PO is more concerned with the economy of its own affairs than with the rate-making standards of the Civil Aeronautics Act, he added.

New ATC Officers: Here are the newly-elected members of the Air Traffic Conference of the Air Transport Association, named at the Nov. 16 meeting at the Blackstone Hotel, Chicago. Left to right, M. F. Redfern, executive secretary of ATA; Nelson B. Fry, traffic manager of United Air Lines, Chicago, who was elected second vice president; Vincent P. Conroy, TWA's vice president-traffic, elected president, succeeding D. D. Walker, Chicago & Southern's vice president-traffic, and Charles Beard, Braniff's vice president-traffic, elected first vice president.

51,800 U. S. Airlin... Employees Estimate...

A total of 51,800 persons are ... employed by the U. S. airlines ... cluding Pan American, Ameri... Export and Pan American-Gr... according to Washington estim... The estimate, it is said, was ba... on actual employment at June ... 1940 and June 30, 1941.

The 51,800 is composed of: ... eral and administrative, 3,108; ... ations-direct (pilots, co-pilots, ... ards, stewardesses, etc.), 8,841; ... ations-indirect, including mecha... 29,793; indirect flying maintena... (superintendents, clerks, some ... chanics, storekeepers, etc.), 4,... and traffic and advertising, 5,36...

Trucking Officia... Ask Air Rou...

Freight-Flite Inc. has asked ... Civil Aeronautics Board for a ... express certificate to operate ... tween Boston and New Orleans ... New York, Newark, Philadel... Baltimore, Richmond, Charlotte, ... lanta and Birmingham.

Officers of the company are ... cival Christopher Baylor, of B... lington, N. C., president; L. H. P... ramore, Baltimore, Md., vice pre... dent; LaVonda Little Baylor, B... lington, secretary; Welling M. L... Graham, N. C., treasurer. T... above are all directors, and in ... dition L. P. Walsh and Edward ... Welliver, both of Washington, ... also listed in that capacity.

Baylor, Parramore and Lodge ... been engaged in the highway tra... transportation field. The $1,000 ... subscription necessary to enable ... corporation to commence busi... has been subscribed and paid for ... Baylor.

The applicant, through Baylor ... Parramore, "has direct contact ... a sufficient number of prospec... shippers of less than carload ... freight for shipment to and ... the territory which applicant ... poses to serve, and through ... experience have familiarized the... selves with the transportation ne... of the territory here involved," ... plication said.

Company's headquarters are ... as First National Bank Bldg., Ba... mire, Md.

New Airline Asks Houston-St. Lo...

Southwestern Air Lines Inc. ... filed application with CAB for ... mail-passenger-express freight ce... tificate covering operations betw... St. Louis and Houston via Shre... port and Little Rock.

Officers are listed as T. K. Jac... son, Jr., of Mobile, president; V. ... McLeod, of Galveston, vice pre... dent, and T. K. Jackson, of Mob... secretary-treasurer. Stock subscr... tion of $1,000 necessary to en... the company to commence busi... has been subscribed and paid ... the application said.

Company's headquarters are ... as 625 Cotton Exchange Bldg., Ho... ton.

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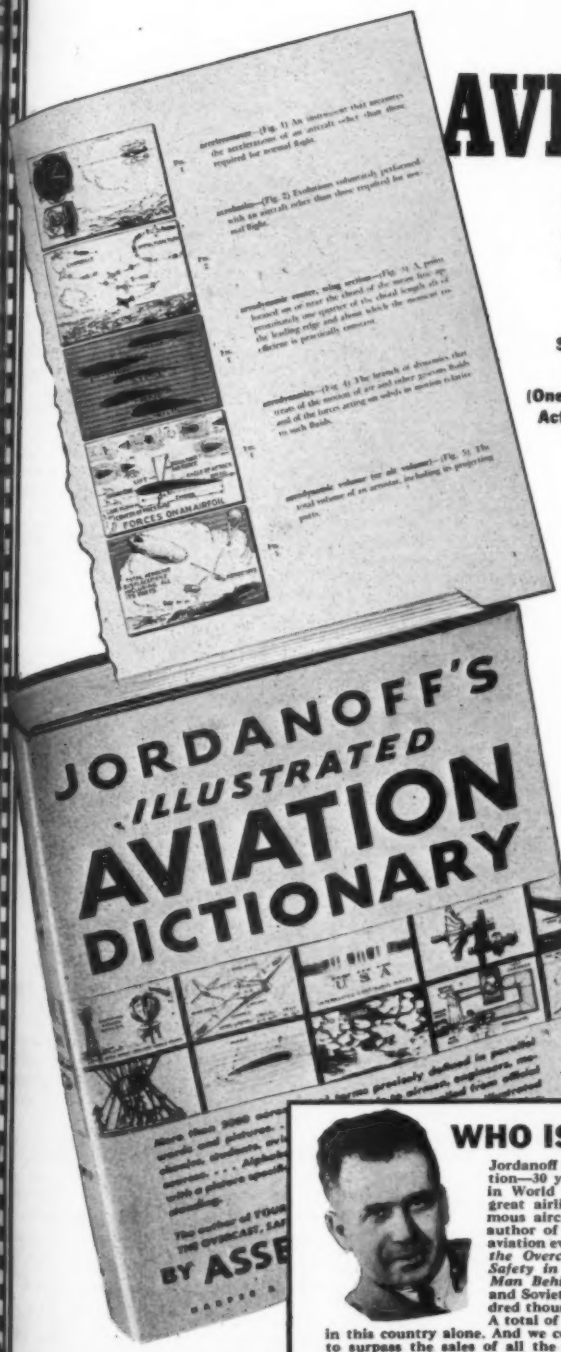

SAMPLE PAGE (One-Sixteenth Actual Size)

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AIRLINE COMMENTARY

There seems to be some confusion in the CAB, as well as among the airlines, as to just how the excess profits tax will affect the airlines . . . After checking around, however, the general consensus of opinion seems to be that some airlines will certainly be hit . . . A simplified explanation of how the excess profits tax on airlines will be computed is: first, the company's normal net income will be determined; from this will be subtracted air mail pay and an excess profits "credit" . . . If the result puts the airline in the excess profits tax class, air mail revenue will be added to this result and the tax computed on the total . . . So, some airlines are going to be hit . . . E. T. "Woody" Nunneley, assistant general counsel of the Board, probably knows as much or more about the situation as anyone . . . Nunneley, incidentally, only recently assumed the title of assistant general counsel . . . The choice is a popular one . . .

●

CAB's study of airline plane utilization, was very revealing and significant . . . It showed that the airlines are using their DC-3s about 26% and their Lodestars 47% more than they were six months ago . . . Not more than a year ago there were persons both within and outside the aviation industry who were saying even then that the airlines were operating their equipment up to the hilt . . . It's marvelous what a war can do . . . And safety standards haven't been lowered . . .

●

A month ago this column suggested that the airlines needed to do a good educational job to explain to passengers why some flights, with heavy mail-express loads, depart with empty seats . . . We asked for suggestions, and we got them . . . Edward Churchill, of Consolidated Aircraft Corp., wired as follows: SUGGEST . . . CERTAIN SEATS BE MADE QUICKLY DETACHABLE IN ALL TRANSPORT PLANES FOLLOWING LEAD OF CONSOLIDATED LIBERATOR C-87 CARGO PLANE WHICH HAS ALL SEATS DETACHABLE, REMOVABLE. REMOVAL OF SEATS WHEN MAIL AND EXPRESS MAKE THEM UNOCCUPYABLE WOULD CONVINCE PASSENGERS, ALLOW GREATER FREEDOM OF MOVEMENT OR STORAGE SPACE IN CABINS AND ELIMINATE WEIGHT OF REMOVED SEATS . . . We haven't talked to any airline men about it, but it sounds logical . . . Of course a system would have to be worked out whereby extra seats would be available at all stations . . . Ralph M. Eastman, of State Street Trust Co., Boston, writes, "How about having a cardboard silhouette . . . marked 'Mr. X.S. Cargo.' Put those in the seats and they'd explain themselves, perhaps . . ." Bob Johnson, United's publicity director, sent a booklet entitled "When Is a Mainliner 'Sold Out'," which the company distributes to passengers . . . The booklet tells the story well . . . An illustration explains that a loaded mainliner is made up of not only passengers, but cargo and fuel as well . . . Paul Niles, assistant to the vice president of Braniff, writes that "passengers were indeed wroth to find empty seats . . . When they had to move heaven and earth to get aboard themselves" . . . As a result, Braniff prepared an excellent folder which Niles says has "materially reduced the number of complaints we have received" . . . Like United's the folder explains that passengers, cargo and fuel must all be considered . . . It adds that the wind sometimes rides "as a passenger in the empty seat" . . . More of these kinds of publicity are what the public needs . . . Any more suggestions? . . .

●

On Dec. 1 we decided to check Christmas business . . . Deliberately picking Dec. 1 because it was almost a month before Christmas, we contacted the airlines operating into Washington (plus United and TWA, who offer connections) and asked them if they expected to be sold out, if people were making reservations an unusually long time in advance, etc. . . . The answers were conflicting . . . The airlines expect to be sold out, and people are making reservations well in advance . . . One airline said it expected to have the "heaviest demand with the fewest seats" . . . However, others said that although many Dec. 24 trips were already sold out, the demand did not equal that of former years . . . They attributed this to the fact that most people were not willing to take a chance on making a reservation for such an important occasion as Christmas, only to be thrown off at the last minute for priority passengers . . .

●

The 1943 airline calendars are putting in an appearance . . . The first one to arrive in this office was Eastern Air Lines', the third week in November . . . Bill Sumits is to be complimented for a splendid job on TWA's calendar . . . American's, as usual, is good . . . We haven't seen the others yet . . .

E. B.

Bulletin

The United States Court of Claims on Dec. 7 rejected the suit United Air Lines, Boeing Air Transport and Pacific Air Transport $2,552,963.94 damages resulting from the cancelation of air mail contr in 1934. The companies were awarded $364,423 as compensation for carried before the cancelations. The Court found that the United panies entered into a combination to prevent competitive bidding, were thus liable to contract cancelation. Details will be carried in Jan. 1 issue of AMERICAN AVIATION.

Froesch

(Continued from page 27)

should be a prerequisite as well as quick action extinguishing means.

Refueling and reoiling should be accomplished from the under-wing surface to eliminate the necessity of climbing over the top of the wing which in the past has always caused substantial distortion of the wing leading edge, has been the source of accident hazard, besides incurring additional labor time.

Obviously, power plant assemblies must be designed so as to be quickly changed. This is a most desirable feature which has been lacking on all transport airplanes designed to date.

In general, reliability must govern detail design which should consider adequate bearing surfaces, ease of lubrication and self-lubrication for inaccessible places, adequate brakes, readily accessible and removable engine cowling and inspection doors bearing in mind that maximum utilization of equipment is one of the requirements for low operating cost.

In other words, the airplane should be designed so preventive maintenance and service methods can be best applied.

Cabin pressurization offers an increase in speed at high altitude but it is questionable as to whether the increase in structural weight and initial cost, as well as additional service and maintenance costs, will warrant its application to cargo airplanes, at least for the time being.

In order to simplify the ground handling of the cargo prior to loading or unloading, and gain a saving of ground time and labor, I would like to enter a plea for standardization of cargo loading door to ground height, possibly door size, cargo tiedown equipment within the cabin itself, and containers for the collective handling of small shipments, as it is not believed possible to standardize to any great extent on package size, except perhaps on the type and materials used in packaging in order to reduce tare which represents a high percentage of the total weight of the article being shipped. This is an important item which needs emphasis and will require an intelligent and imaginative study when it is considered that at present approximately 30% of the weight of express shipments is packaging.

The development of air cargo will serve to accelerate the distribution of national and international wealth and promote similar commerce. It will allow greater enjoyment of the material wealth of the earth and it is hoped will also serve to eliminate intercontinental friction which since the world began has been the source of destructive warfare.

Army Court Martial Acquits AAF Flyer in Airline Accide

After a trial of less than th days, an Army court martial Nov. 25 acquitted Lieut. Will N. Wilson, accused of manslaugh in the death of 12 persons after Army bomber collided with American Airlines DC-3 near P Springs, Cal., on Oct. 23.

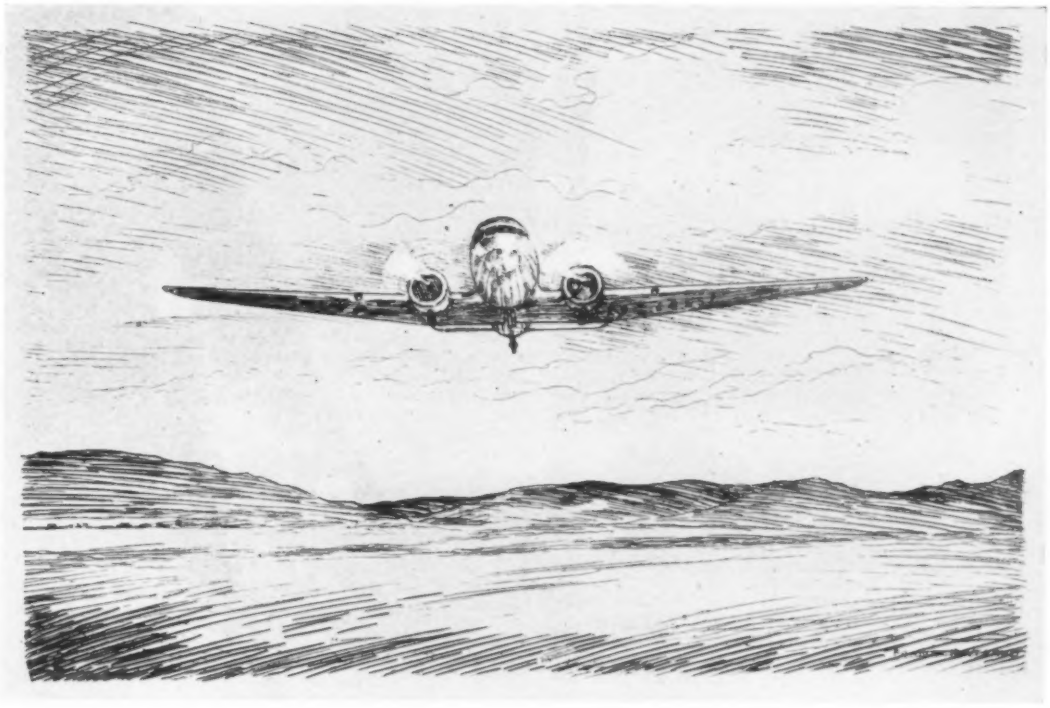
On Nov. 28, Mrs. Ralph Raine wife of the well-known compos killed in the accident, brought a against Lieut. Wilson and the a line for $227,637.

Surprise witness in the Ar flyer's trial was Private Roy We who claimed that he saw the acc dent. "The airliner came in und the bomber," he was quoted as te ing the court martial. "The tail the airliner seemed to come up a hit the bottom of the bomber. T tail was knocked off and the a liner fell."

The court, composed of 10 colone majors and a captain, deliberate only 37 minutes before returni its verdict.

The Select House Committee t Investigate Air Accidents ha blamed Lieut. Wilson for the acc dent. CAA officials appearing a the committee's hearing charged th the Army flyer had been operati above 3,500 ft. without CAA pe mission.

Export's "First": The first women to fly the Atlantic on schedule are American Export Airlines' stewardesses. Four of them are shown above (l. to r.: Margaret Siegfried, Kathryn Friedrich, Genevieve St. Mary and Adele Jenkins.



The multiplying wings of free men
are destined to keep bright the hope
for universal brotherhood—
that hope born nearly two thousand
years ago this Christmas season.

TRANSCONTINENTAL & WESTERN AIR, INC.

Text of Patterson Speech

(Continued from page 30)

ton-miles-per-hour are the same. Of course, two freight trains could move the entire 1,560 tons from Chicago to San Francisco in six days time and our airplanes could do it in about half a day, if 626 of them were assigned to the job—but that is another story. Prior to December 7, 1941, there were only 362 commerical transport airplanes in use on all the airlines in the United States.

For the large bulk of commodities, speed in transit is a relatively unimportant consideration. The most important factor is the rate of flow—the laying down at destination of a given number of tons per month.

In the example I have just given, one Mainliner type cargo airplane was approximately equivalent to one freight car in the amount of work accomplished per month. If the airplane is to be visualized as taking over the entire job of all the freight cars in the country this is perhaps an unfair comparison. Due to the long-haul nature of our example, we made the freight car work overtime, 300 miles a day, as against an actual country-wide average of only 36 miles a day. If the airplane were to take over the entire job being done by the nation's freight trains, its efficiency might be expected to drop too, because of the short-haul characteristics of the preponderance of traffic, the unbalance between directional movement, seasonal fluctuations, and the tremendous terminal problem that would result.

A fair comparison might be to expect one of our present-day airplanes to do the work of three freight cars. It is reported that we have in this country 1,800,000 freight cars and on this basis 600,000 transport airplanes of the present commercial type would be required to replace them. During a year's time these planes would consume 122 billion gallons of gasoline, which is two and one-half times more gasoline than the prewar cracking equipment capacity of all the refineries in the world. two and one half million pilots would be needed to fly this fleet, and the total airline personnel would run 20,000,000, or 15 per cent of cur entire population. This would be a very substantial contribution to the solution of any postwar unemployment problem, if only the cost were not so great.

ICD Head: Otis Bryan, general manager of TWA's Intercontinental Division, works at his desk in Washington from where he directs the division's far-flung operations.

Compares Freighter

Let us now turn to a comparison of today's ocean-going freighter and the cargo airplane. For our freighter we will use a vessel of 13,000 tons loaded displacement similar to the type currently being constructed in great numbers by our shipyards for the Maritime Commission, and we will sail it between San Francisco and Brisbane, Australia. The revenue load of such a ship would be 6,400 short tons, and in peacetime operation it might be expected to make the round trip of 14,000 statute miles in two months' time. The fuel oil consumed for the round trip voyage would be 425,000 gallons, which would cost about $9,000. There would be 55 in the crew and their pay for the two months' period would total $15,000. Based on the experience of a coastwise shipping company, probably high for trans-Pacific operation, the total operating costs chargeable against the two month round trip would be $120,000.

The airplane we are going to use to perform this same job of moving 6,400 tons of freight from San Francisco to Brisbane and another 6,400 tons on the return trip, all in two months time, would be of the four-engined type which but for the war might be in use on our airlines today, and which is currently being used by the Army in some of its transport operations.

1,440 Round Trips

Such an airplane would carry four tons of revenue load over the distances required between fuel stops, and therefore 1,440 trans-Pacific round trip flights would be required over a period of two months to transport the load carried by the surface freighter in one round trip. This requires an airplane departure every hour, and represents 21,000,000 miles of airplane flying compared to 14,000 miles of surface ship travel.

An airplane can make the round trip in six days and therefore could fly ten round trips in the two months. One hundred forty-four airplanes would be required. These airplanes would consume about 18,000,000 gallons of gasoline while the boat was burning less than a half million gallons of fuel oil. The cost of this gasoline would be $2,250,000 compared to $9,000 for the ship's fuel. Thirty-five hundred airplane crew personnel would be needed as against 55 to man the boat. The airplane crews would receive a total of $3,000,000 in pay for the two months compared to $15,000 in wages paid to the ship's crew. Total airplane operating costs, based on present figures, would reach an aggregate of $29,000,000—250 times the surface freighter's round trip cost of $120,000. Again, both have performed the same job in ton-miles-per-hour.

Refueling is still another problem that the airplane would have to meet in competing directly for the more substantial tonnage capable of being carried by the ocean vessel. Nearly 15,000,000 gallons of gasoline would have to be transported to intermediate points and to Australia every two months by ocean-going tankers. Three such tankers would be required for this purpose so that actually 144 airplanes plus three tankers would be required to do the job that could be accomplished by one ocean-going freighter in the first place.

These figures which I have quoted are interesting, but their main significance is not appreciated until we trace this transportation cost to the value of some typical commodities that you and I find it necessary by buy. For example, of our total exports to Australia the most important single group in terms of value is machinery. Typical of this group would be ⅓ hp electric motors, which have an export value of about 30 cents a pound. From the comparative cost figures that we have just developed it can be computed that the rail transportation cost of these motors from Chicago to San Francisco would be 8/10ths of a cent per pound, and the shipping cost by surface vessel from San Francisco to Brisbane, Australia ½ cent per pound. The total cost of transportation from Chicago to Australia, amounting to 1⅓ cents a pound, is equivalent to four per cent of the value of the motor. That is the transportation cost by surface means. If shipped by air, the cost from Chicago to San Francisco would be 31 cents per pound (slightly in excess of the value of the motor), and from San Francisco to Brisbane $1.28 per pound. The total is $1.59—over five times the per-pound value of the motor. This high transportation cost might be well justified if some plant in Australia were shut down due to motor failure and no replacements were available locally.

15 Years: John A. Casey, superintendent of Chicago Municipal Airport, celebrates his 15th anniversary in that post as United Air Lines Stewardesses Marie Fisk and Marjorie Harrison help him blow out the candles on his "birthday" cake.

By use of the airplane the ... could be operating again in ... days, whereas if the replace... motor were shipped by ... means, four weeks would ... before the situation could be ... edied. Under such circumst... such a high tariff would no ... be justified, but for the large ... tities of motors needed to ... normal demand, the high co... transportation by air would be ... to justify.

On the return trip a typical ... modity imported from Austral... raw wool, also having a valu... about 30 cents per pound of ... ping weight and therefore ... give us the same effect on the ... of such wool laid down in ... Francisco. Among our 1940 imp... from Australia there is listed ... ounces of platinum valued at ... 000, equivalent to a value of ... a pound. Here the cost of ... transportation would amount ... 3/10ths of one per cent of the ... of the commodity—a ratio ma... such shipments entirely practi... Unfortunately, there were only ... ounces to be shipped.

Major Economies

Admittedly, the examples I ha... given you are based on present-... costs which are without ques... high because our business is ... tively new and we haven't yet ... the opportunity to take advant... of all possible economies. Furth... more, I would not want to leave ... impression under any circumstan... that we haven't confidence in ... ability to take advantage of ... nological advances in the design ... equipment and increases in ... efficiency in the use of equipm... that will bring about very ma... economies.

But these examples afford ... idea of the magnitude of the pr... lems that must be solved and ... time required to solve them if ... cost of air transportation is ... to be brought down to a level wh... it can compete with surface tra... port on a strictly dollars and ce... basis.

Terminal Costs

There is still much uncertain... as to the cost of operating the gi... airliners projected for the futu... Most studies we have seen tr... direct flying costs in considera... detailed accuracy and then slap ... overhead on the basis of a fi... percentage. This is the procedu... usually followed by those who ha... not had the opportunity of actual... being engaged in airline operati... They have given very little atten... tion to the evaluation of termin... costs, and pickup and delivery ... merchandise either side of the ter... minals. Surface carriers ha... found that their terminal costs ar... at least equal to and often greate... than their over-the-line costs.

Little thought has been given t... the fluctuation of traffic within th...

(Turn to page 40)

Maybe he's *your* boy

IT seems only yesterday he was a gawky schoolboy, all hands and feet and tousled hair.

Even then you worried a little, parent-like, about how fast he drove his battered jollopy.

Now he's flying—or soon will be—the deadliest weapon in the air, a sleek 400-mile-per-hour fighter.

Or perhaps his battle station is the bombardier's "barber chair," or the tail-gunner's "goldfish bowl" in a giant bomber, or at the controls of a U-boat-hunting blimp.

Whatever his duty, more than your fears and your prayers fly with him—all your hopes, all your dreams for him and for your country ride in that aircraft, too.

What cost of effort or zeal or self-denial is too great—if it will give him the finest plane, the safest equipment in the air?

We feel the same way about it here at Goodyear Aircraft. Many of our men and women have sons, or brothers, or husbands, in the air forces, too.

And beyond this there is the sober knowledge, clear now to all Americans, that our cherished liberty, our standard of living cannot be secure again until this nation wins command of the air—and it is these boys who must win it for us.

It is for them, your lad and ours, that Goodyear aircrafters—welders and riveters, pressmen and foremen, engineers and executives together—are striving with all the skill and ingenuity of long aeronautical experience to help build the safest, sturdiest airplanes and airships modern engineering can create.

It is to give them mastery of the skies that we are working in round-the-clock shifts, seven days a week, to produce our full share of the airplane subassemblies—wings, tails, control surfaces, cabin units, wheels, brakes and other parts—for the 60,000 airplanes America must have this year.

In this we are working with and for the manufacturers of some of America's most famous battleplanes, both fighters and bombers, that are proving their superiority on all fronts.

If your boy is flying one of them, you can be sure his craft is as staunch and airworthy as scores of great American industries cooperating together can make it.

For these boys, yours and ours, are the hope of America, the guardians of the greatest heritage ever given to any people. They will not fail us, nor we them.

HOW GOODYEAR AIRCRAFT CORPORATION SERVES THE AIRPLANE INDUSTRY

1. *By building parts to manufacturers' specifications.*
2. *By designing parts for all types of planes.*
3. *By re-engineering parts for mass production.*
4. *By extending our research facilities to aid the solution of any design or construction problem.*

GOODYEAR AIRCRAFT

Patterson Speech

(Continued from page 38)

day, from season to season, or to the unbalance in directional traffic flow, or to the short-haul nature of the greater part of all traffic. All these things tend to set limits on utilization and load factors which no one other than those engaged in the business can determine.

Our Engineering Research Department has tabulated the possible reductions in direct flying costs that might result from a full realization of all the technical advances that are now in the development stage. Included are such possibilities as: (1) Design of the aircraft to suit the job which it must perform; (2) Higher lift and lower drag characteristics; (3) Advances in structural design and materials, allowing major increases in useful load capacity; (4) Power plant improvements such as lowered fuel consumption, partial set propulsion; (5) Improvements in terminal and aircraft loading and unloading facilities; (6) Improved airports—layout and size.

All of these things taken together might reduce direct flying costs as much as 60 per cent, but taking overhead costs into consideration total costs would probably be lessened only by about 35 per cent. This would be at current traffic volumes. The effects of increased volume in reducing costs is well known in all lines of business. In the air transport industry based on the record of its performance to date, and assuming that the law of diminishing returns will not begin to exert its tempering influence, we might logically assume that a hundredfold increase in all traffic volume from today's levels would result in a further reduction of 60 per cent in total unit costs. Therefore, the combined effect of all the presently contemplated engineering advances plus a hundredfold increase in volume might be expected to reduce overall ton-mile costs from their present average of around 40 cents to levels somewhere in the neighborhood of 10 cents per ton mile, still many times the cost of surface transportation which measures its ton-mile costs in mills.

We must also bear in mind that while the air transport business is reducing its costs the railroads and the steamship companies will be doing the same. I have the greatest respect for the management of our railroad systems in this country and I am sure that they will also be making progress, particularly as a result of the benefits in the experience of doing the grand war job they are accomplishing. Improvements in their rolling stock and trackage, held in abeyance because of the war, will some day provide additional tools in their competitive sales kits. With the potential for greatly lowered costs existing in all fields of transportation, it appears to me logical to assume that there will be a tendency to maintain present cost differentials, or at least to put a brake on a possible converging trend.

One may conclude from these remarks that air transportation's future is not particularly bright. I want to emphasize again that my objective here is simply to rationalize the overenthusiastic statements being made which can be temporarily damaging to the interests of all transportation.

As I see it, air transportation is going to revolutionize practically every social and economic viewpoint and practice. In the field of passenger travel, the airplane may well take over a major share of the volume. Passengers as a commodity have a high value per pound and per hour and require a relatively large amount of cubic space. These factors combine to make the costs of transporting passengers by surface means and by air some... more comparable than is the ... with other cargoes. Individuals ... also influenced by considerations ... convenience, comfort and such ... intangibles as the romance ... prestige associated with travel ... air.

But an inanimate piece of ... presents a different problem. ... values per pound bear a much ... relationship to transportation ... The time saved must be bought ... time, and it must be strictly ... the saving, and weight can be ... centrated in a much smaller ... . . .

The airplane will facilitate ... speed up the exchange of ... through personal contact, and ... written word. Community of ... terest will be aroused and ... grow. Personal and business ... never before possible by slower ... face conveyances, will be ... by the airplane. Better and ... wide-spread first-hand understanding of other peoples' problems ... ways of living will result. ... thinking and methods of the ... progressive peoples of the ... will more easily and rapidly ... spread to the more backward ... tions, tending to accelerate ...

(Turn to Page 42)

Unfailing

PERFORMANCE

In step with the swift progress of aviation, the modern parachute has come into its own as a vital implement of war. It saves the lives of aviators in distress, brings food and equipment to besieged troops, and drops Paratroopers behind enemy lines. Such assignments call for unfailing performance . . . absolute perfection in every detail and every step of manufacture. With never-ending scientific research, technical developments, testing and inspection throughout every process of production, Pioneer Parachutes have stood these rigid tests, and today stand in the forefront of the industry.

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New propeller with a Destiny

After nearly two years of intensive development, Wickwire Spencer announces a revolutionary, *fully* automatic, variable pitch propeller. Now that it has passed repeated tests, and is in production, the news can be told.

In the Wickwire Automatic Propeller the pitch *adjusts itself* for maximum thrust at all airspeeds or altitudes, for all flight conditions. The action is instantaneous, smooth. The propeller is light in weight, simple and dependable in construction. Eliminated are all electrical, hydraulic or mechanical equipment and circuits for changing the pitch.

What this engineering accomplishment means: It shrinks take-off distances required, produces faster climb. The highest airplane speed, at any throttle setting, is now obtainable automatically without the pilot's giving it a thought. It also means getting the most air-miles per gallon. By doing away with the need for manual control, it marks a new milestone in safety.

The immediate opportunity for the Wickwire Automatic Propeller is to help win the war. With Victory, its destiny will be to help make the world's peacetime flying simpler, speedier, safer.

Propeller Division, Wickwire Spencer Steel Company, 500 Fifth Avenue, New York City.

WICKWIRE SPENCER STEEL COMPANY

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TRANSPORT

Traffic

Air Express Division, Railway Express Agency, reports a total of 57,063 shipments was moved through its office at LaGuardia Field during October, an increase of 5,520, or 10.7% over October, 1941. Gross revenue of air express for the 1942 month was up 61.5%, including "aviation materials of all kinds."

United Air Lines announces it flew 755,069,000 express pound miles in October, 145% more than the 307,762,832 a year ago. Mail pound miles in October totaled about 1,453,404,000, up almost 106% from the 706,087,845 in the same month of 1941.

Canadian Civilian Airlines, according to figures released by the Bureau of Statistics at Ottawa, carried 20,162 revenue passengers and performed 6,654,938 passenger miles last July, compared with 22,134 passengers and 7,119,380 passenger miles in June, and 19,091 passengers and 5,670,742 passenger miles in July, 1941. Mail carried decreased from 450,795 lbs. in June to 378,293 in July. Revenue freight dropped from 1,140,991 lbs. in June to 1,119,721, but revenue ton miles increased from 120,407 in June to 140,844 in July, against 80,052 in July, 1941.

Braniff Airways, Inc., discloses that in the first nine months of 1942 "a number of daily schedules had to be discontinued . . . because of the conversion of airline equipment to foreign army cargo operation." Figures on operations in that period, with those for 1941 in parentheses, follow: Seat miles operated, 59,585,228 (71,155,454), down 16%; seat miles sold, 37,954,828 (32,435,596), up 17%; mail pound miles, 734,461,815 (480,679,989), up 53%, and express pound miles, 275,211,961 (148,599,876), up 85%.

Air Express Division, Railway Express Agency, reports it also had a large increase in shipments for first nine months of 1942. It handled a total of 15,085,345 lbs. currently, against 7,927,181 lbs. in 1941, a gain of 90%. Number of shipments in the same period of 1942 was 1,033,761, contrasted with 947,760 in 1941, an increase of 9%. "January-September figures of combination rail-air express traffic . . . showed an increase of 22% . . . over 1941." In September, weight of air express shipments was 2,233,043 lbs., up 102%, and "the highest monthly total in the 15 year history of the service." Number of shipments currently was 122,554, 7,507 more than in Sept. 1941.

Pan American Airways announces its freight operations between Miami and Latin American points show large increases in recent months. Air freight carried by the Eastern division totaled 736,600 lbs. during the last reported 30 day period, an increase of 1,023% over the comparable period a year ago. In the first nine months of 1942, PAA carried 3,246,549 lbs. of freight between Miami and Latin American airports. This compares with only 480,453 lbs. in the same period last year.

Pan American Airways reports its Eastern division flew 6,197,918 miles during the first nine months of 1942, which figure exceeds that for the entire year of 1941. Clippers flew 787,311 miles during the last reported 30-day period. Passengers leaving and entering Miami totaled 8,585 in the last reported 30-day period, up 32% over the number carried in the same period a year ago, and "nearly double" the amount of two years ago.

What's Going On In Washington?

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Actions of the Civil Aeronautics Boar

Order No. 2029, Nov. 10, 1942: Amended section 32 of the Uniform Syste Accounts for Domestic Air Carriers (CAB Form 2780 Manual), and in a amendment No. 3 set forth the revisions in reporting procedure, which h effective Nov. 20, and were applicable to report for month of Oct. 1942.

Order No. 2031, Nov. 13, 1942: Suspended for six months private pilot cer No. 10527-40, held by Milton S. Rich, for various alleged violations of the Air Regulations.

Order No. 2032, Nov. 13, 1942: Restricted for one year student pilot certi No. S-260907, held by Harold E. Schenk, so that he can pilot aircraft "only receiving instruction . . . making check flights accompanied by instructors or while on military duty." CAB claimed that Schenk "on or about June 7, . . . over a congested area of the city of Indianapolis, Indiana . . . (flew) altitude of less than 1,000 feet," and committed other violations.

Order No. 2034, Nov. 13, 1942: Revoked mechanic certificate No. 5196, h Donald B. Crouse.

Order No. 2035, Nov. 13, 1942: Denied application of All American Aviation, which requested exemption from provisions of section 401(a) of the Act regarding designation of Nitro, W. Va., as an intermediate point on its route

Order No. 2038, Nov. 13, 1942: Established, in detailed analysis of operati All American Aviation, Inc., tentative rates and compensation for that transportation of mail on its route No. 49.

Order No. 2039, Nov. 18, 1942: Suspended for six months private pilot certi No. 78219-41, held by Lee E. Schmidt, for various alleged violations of the Air Regulations.

Order No. 2041, Nov. 18, 1942: Revoked mechanic certificate No. M-5569, by Fred B. Sawtelle, for what CAB claims were carelessness and improper p of parachutes, and other alleged violations of the Civil Air Regulations.

Order No. 2042, Nov. 18, 1942: Revoked private pilot certificate No. 16 held by Charles E. Savage, for allegedly breaking various Civil Air Regulat

Order No. 2043, Nov. 20, 1942: Suspended for four months student pilot tificate No. S-236484, held by Orville M. Anderson, for several alleged viola of the Civil Air Regulations.

Order No. 2044, Nov. 20, 1942: Approved the holding by O. M. Mosier of tions as vice-president and director of American Airlines, Inc., and as di of Air Cargo, Inc.

Order No. 2045, Nov. 23, 1942: Restricted use of private pilot certificate 154045, held by Clare A. Graft, to flying only while "receiving instruction making check flights . . . or while piloting aircraft on military duty," allegedly falsifying statements of flying records.

Order No. 2046, Nov. 23, 1942: Revoked private pilot certificate No. 69166, by Harry J. Smith, for various alleged infractions of the Civil Air Regulati

Order No 2047, Nov. 23, 1942: On request of Postmaster General, Nov. 12, reopened the case of mail compensation for Eastern Air Lines, Inc., for f consideration and argument.

Order No. 2048, Nov. 24, 1942: Authorized American Airlines, Inc., to serve Diego, Cal., through the use of Lindbergh Field, beginning Nov. 22, 1942.

Order No 2049, Nov. 24, 1942: Authorized American Airlines, Inc., to inaugur on Nov. 22, 1942, non-stop service between Tucson, Arizona and San Diego, C on route No. 4.

Order No. 2050, Nov. 25, 1942: Suspended for 60 days mechanic certificate 21970-40, held by Emery B. Ersek, for alleged carelessness in installing a pl motor.

Order No. 2051, Nov. 25, 1942: Directed that the case of Pan American Airwa Inc., compensation for transportation of mail, be reopened for additional e dence and argument in certain respects, and that Pan Am's petition be withh from "public disclosure until further order of the Board."

Patterson

(Continued from page 40)

crease in the standard of living throughout the world.

The natural result of all this would logically seem to be a growth in world trade, an increasing demand on the surface carriers for the economical moving of the bulk of the world's goods in trade.

And with a general increase in trade levels, the airplane will find increasing work to do in sustaining the economy it will help to create.

Political emissaries, business organizers, salesmen and their samples—all of these will find their spheres of influence made enormously more effective through the use of airplane travel. All first-class mail, and a large share of express package traffic, will find the airplane a most efficient medium to use in their mission of promoti the general well-being of the wor

The future of the airplane commerce is indeed great—but appears that this future can realized without serious impa upon the steamship lines or t railroads. The volume of domest air cargo could increase one-hu dredfold and yet capture only on tenth of one per cent of the freig ton-miles now carried by the A erican railroads. But, apart fro that, the airplane should be ex pected to stimulate the generati of the type of traffic that is th rightful field for surface carrie

In fact, the business of air tran portion can be considered as sales department for the whol transportation industry, promoting traffic that will redound to th benefit of all forms of carriers, wit each type fulfilling those require ments in our future economy pe culiar to its own inherent charac teristics.

It took FIFTEEN YEARS to build our World Routes, now so vital to Victory

Every American knows the story of Lewis and Clark—the men who pioneered a trail across the North American continent to the Pacific.

But few Americans know the story of how Pan American Airways—our Merchant Marine of the Air—pioneered skyways across two oceans and down the length of South America in the short space of fifteen years.

In Central and South America, cloud-piercing mountains, hundred-mile swamps and deadly jungles blocked the path. For much of the territory, no accurate maps existed . . . None had been made since the 17th-century charts of the Spanish, Dutch and French explorers.

To equip some of our early airports on the route to the Panama Canal, gasoline had to be carried in *by hand*—long lines of natives, each with a five-gallon tin balanced on his head.

In the Pacific, at Midway and Wake Islands, there were no harbors . . . Construction materials had to be towed through heavy seas, floated over barrier reefs and landed on the beach despite the heavy breakers.

Across Africa also, airports had to be hacked out of jungles and built up on desert wastes. At some points the only available hauling power was furnished by camels . . . Native Africans who had never seen an airplane were employed as artisans.

In Alaska, summer is brief—roads did not exist. Airports had to be built on unfriendly swamp morass or, when it was available, on glacial gravel and sand.

• • •

Today all these routes are playing their part in hastening Victory for the United Nations.

Without exaggeration, it can be said that the existence of facilities pioneered by Pan American has saved the United Nations' aerial war transport many long months.

Wings over the WORLD

PAN AMERICAN CLIPPERS

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Curtiss-Wright Technical Institute, under the personal supervision of Major C. C. Moseley, President and sole owner, is America's most distinguished school specializing in the training of Aeronautical Engineers and Master Aviation Mechanics. Its standing in the industry is attested by its selection by Donald W. Douglas, President of the great Douglas Aircraft Company . . . as the school for his own son's training.

Its accumulated experience of many years in technical aeronautical instruction supplies the aviation industry with graduates thoroughly trained as supervisory personnel and is now being utilized in the National Defense Program by the U. S. Army Air Force in the training of hundreds of enlisted men as Air Force Mechanics. Its associated organizations, Cal-Aero, Mira Loma and Polaris Flight Academies, are extending primary and basic training to Aviation Cadets of the U. S. Army Air Force. With proved and tested curriculum and unsurpassed faculty of practical engineers and technicians, we take great pride in filling the industry's call for men "trained to precise order" . . . . the career men on whom aviation's future depends. Curtiss-Wright Technical Institute's unsurpassed facilities are capable of still further expansion if necessary to meet our county's demand for "QUALITY graduates for QUANTITY production" of thousands of bombers, cargo and pursuit ships that will assure us victory.

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GRAND CENTRAL AIR TERMINAL
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CONTRACTORS TO THE
U. S. Army Air Corps

Total Planning Can Assure Airline Futur

Program for Progress Must Accompany Deflation of Public Ardor

By E. J. FOLEY

THE wise current trend is toward deflation of public over-enthusiasm for air transportation. Yet the industry visualizes a very bright post-war future. In realizing and frankly declaring the physical practical limitations of its sphere of operation, the industry fulfills half of today's responsibility.

The other half, just as vital, demands the development of an integrated *plan* for tomorrow. Remember that there will be a million and more men—aviation-trained and enthusiastic, returning on that tomorrow and expecting to find that closely knit plan.

Foley

Many of them will never return to that career in law or medicine or business administration or finance. Their futures will be in air transportation. We feel it is not amiss to predict that their influence will be great and proper. Any dissatisfaction with their chosen industry, whatever it be, will be publicly and privately effective and focused upon inflexible or outmoded fuddy-duddy policies, inadequacy of organizational specifications and temporary expedients, crutches if you will, beclouding long-range planning.

In our minds, air transportation's proper goal for today and tomorrow is the efficient, publicly satisfactory performance of *all* that *is* our domain. The keystone of both such performance and the planning of it is the airplane itself. Further factors are: the operating *organization* and its *policies*, servicing and handling *areas, equipment* and *methods*, ground and air operating *areas, facilities*, and *techniques*. Unless these factors in tomorrow's airline are more than simple dimensional expansions of today's—we cannot hope for increases in anything but business capacity. The size of the truck and the width of the road are not of themselves prime factors in the customer's selection of a carrier.

Of the foregoing factors, one—the operating organization and its policies, must be considered singly. We have recently been made acutely aware that many men within the industry, sub department heads and mechanics alike, are questioning the future. They are feeling their way in the fear that the air transport business is presenting a realistic exterior to the public but a camouflaged, beclouded interior to its personnel. Concrete logical reasons for this thinking are hardly abounding. The turmoil of the times is largely responsible, we are sure.

Yet it would be well for management to spend a few minutes in introspection and a few minutes more in divulging the appropriate results of that introspection to its staffs. A past as rapidly progressive as that of the airlines, while bound to produce growing pains, portends a planned future. This is the hope and desire of the personnel involved. Policies may grow in complexity as an organization expands. Regardless of complexity, the policy must fit the times and the corporate status. Today, as we visualize a demandingly active future, is a good time to test our policies for flexibility and applicability to what lies ahead.

The basic organizations of the industry's members have never been strikingly specific and distinct, but with good reasons. Comparative youth of the field, amazing rapidity of growth, lack of emphasis upon training for the industry, demanding standards for personnel and governmental regulation overall—these elements have contributed to a high work-quantity per man ratio and rather haphazardly drawn lines of responsibility and work allocation.

As is often the case, as much good as harm arose from this situation. The unique adaptability and versatility has been made part and parcel of the personnel assets of the key men in the field today. Not knowing just when their responsibility ended, and often not having enough help for it ever to end, they tried their hands at everything and have come up as much more than jacks of all trades.

However, we feel strongly that from today forward, we must predicate our personnel expansion upon a clean-cut analysis of lines of authority, specific duties, job standards, promotional lines, etc. The net result of such activity will be specialist-development and detailed work breakdown. While obviously not as conducive to full utilization of each employee's versatility, this technique can result in the maximum productivity and potential efficiency. A policy in recognition of the advantages and disadvantages, personal and corporate, of this system is vital to its success. Administrative guidance of high caliber can, through such a program, assure management of more than mere numerical personnel expansion. It can assure labor of a logical, necessary program of specialist ratings, each specific in scope and duties, each leading to a positive series of merit promotions.

New Shears: Hi-Speed Shears, shown here is a product of the Libert Machine Co., Green Bay, Wis. Requiring no starting hole, the shears is adaptable to irregular, circular or straight cutting. A foot pedal control permits the operator to use both hands for guiding the work. The installation pictured is at one of United Air Lines' maintenance bases.

Closely Intertwined

Our other factors, the aircraft; servicing and handling areas, equipment and methods; ground and air operating areas, facilities and techniques—should be so closely intertwined as to defy separate consideration. The fact that they are not so today, is one threat to tomorrow, a threat which, borne out, will give us an air transport industry whose airplanes and airports will dwarf today's only in terms of inches and feet.

To see these elements developed along the proper lines, we believe calls for our presentation to be idealistic in viewpoint as of this moment, but largely practical in actual application in the immediate future. For our initial assumption in treating these variables, let us say factually that we have 20 years experience with airplanes, their operation, maintenance and handling, and with airports, their areas, structures and facilities. Next, let us assume that we retain *only* that experience; that all the present physical assets of our industry, vehicles and airports alike, are erased. We are then an industry desiring to provide air transportation armed with two decades' experience, a planned flexible policy, and a clearly defined organizational structure patterned to do the job. Starting from this, how should we proceed?

We think there are at least four people, directly connected with our progress, who should proceed with the operator from the beginning. Unless the five of us—airline operator, aircraft manufacturer, airport design specialist, handling and servicing equipment engineer and production expert—keep in step, program for tomorrow will be unbalanced. He who leads will not from those who lag.

It would be the ultimate in ability if all five could go into project without any preconce notion of what the final result the program have to look like have to be in a physical Armed only with the knowledge final function and relationship of the components, and the wealth experience indicative of pitfalls be avoided, the men could the resultant service being of greatest value. We agree with such expressions as Bill Lee wood's that tomorrow's big airp should not be a scaled-up versio today's. Simple expansion in size handling and servicing gear com plicates more than it speeds. Sim size increase in airports would be calamity.

Operator's Part

The air transport operator's p in the project is necessarily leadi His is the direct experience in t "line of merchandise" the gr hopes to develop to a highly marke able stage. From his past service h must draw the basic functional en gineering and economic considera tions and the potential but avoid able weak points. By "air transpo operator" we mean a person or per sons representative of the industr who can marshal the bitter and t sweet regarding flight and ground aircraft specifications, airport func tions, past maintenance and hand ling techniques, economic considera tions of all phases of the busines etc. His function in a nutshell wou be "gaining by giving."

Secondary Design

The aircraft manufacturer w gain by taking. If there is a sh age of design initiative and a w to strict, straightlaced, conventi past practice in our present aircraft manufacturing industry, both be relieved for the duration of the project. If this cannot be done, the some fresh source should be tapp We've mentioned before in these columns the need for an air trans portation vehicle and the airfra manufacturer collaboration which alone can fulfill this need. Letting primary design seek its own level the improvement attainable in sec ondary design, interior cleanliness and functional concept, is tremen dous.

So far, our project resembles an active conference between the Fu ture Aircraft Requirements Com mittee and a potential supplier. But let's bring in the future *airport* re quirements representative. We re cently commented upon the need for specilized airport design and the reaction received confirms our ideas. The instances of planned far-sighted airport design in this country are

(Turn to page 52)

del's Small Valve Answers Hydraulic System Problems

new development in aircraft draulic equipment, the "Stacking get" valve, is the answer of Adel cision Products, Corp., Burbank, to a number of hydraulic sys-

n problems. Designed to permit ltiple controls installation in such all space as forward of control nels, the valve offers the same ce and weight economy as the % smaller and 76% lighter ighty Midget," 4-way selector. The quadruple unit illustrated ighs less than three pounds and sures overall 5 31/32" by 3 3/16" 27/16". Of particular interest to intenance people is that the in-idual valve assemblies may be laced or repaired by breaking y the two cylinder lines affected.

Accurate Strain Gage

The Porter-Lipp strain gage, an erican built instrument, is offered the Baldwin Southwark Division the Baldwin Locomotive Works Philadelphia, to meet the de-nds upon structural testing tech-ques.

A mechanical gage, it is claimed to accurate, inexpensive, light, com-t, rugged and convenient. The in multiplication factor is ap-roximately 300 and it has a range .008" or better. Weight is .4 oz.; e Porter-Lipp has overall dimen-

ons of 2" by 1¾" by ⅝". It is aduated so that each division cor-sponds to a strain of about .0001 , and for a gage length of one ch has a readable accuracy of .00002 in.

Bal-O-Dial

The Bal-O-Dial is a simple in-pensive calculator for aircraft lance-loading. Taking into con-deration all the variables involved, ch as fuel, oil, cargo, passengers, c. the design of the computer may e applied to any type plane. Credit r the invention goes to S. H. Avery, ad of the weight engineers at Con-lidated Aircraft Corp. Avery has en with Consolidated eight years d is a graduate of Worcester lytechnic Institute.

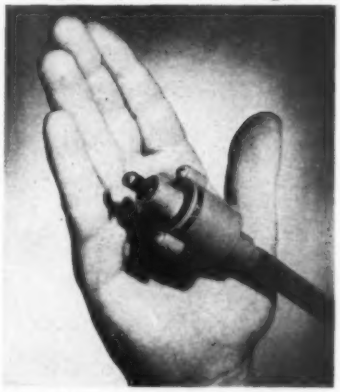
Electrical Aircraft Cables Announced

Wire Division of the Electric Auto-Lite Company, Port Huron, Mich. announces a new series of Auto-Lite Sterling low tension electrical aircraft cables known as "B" Braid Synthetic. Approval to the line has been granted under AN-JC-48 specification for sizes from 22 ga. to 00 ga.

The insulating compound is a synthetic, protected by special "B" type cotton braid, with a newly developed lacquer of special abrasion resistance. Small size, light weight, flame resistant characteristics of all components and low moisture absorption combine to make it the finest combination of physical and performance characteristics in Auto-Lite Sterling's history, it is claimed.

Midget Air Clamp Introduced by Mead

Designed especially for the aircraft industry by Mead Specialties Co., 15 So. Market St. Dept. M-23, Chicago, Ill., this new Midget Air



Clamp has its application in assembly jigs or any similar joining technique.

Certain advantages, as follow, are claimed by the maker: (1) all air clamps in any setup can be operated by a single master valve in the interests of time economy; (2) compactness permits installation in cramped quarters; (3) special delicate adjustments are unnecessary as the ram holds with equal pressure along its entire ⅝" stroke; (4) the clamp delivers 80 pounds on a 100 pound line pressure; (5) any desired group in an assembly can be controlled independently of the balance by the use of separate circuits.

New Drilling Heads

The manufacturers of Wyco Flexible Shafts and Power Tools, Wyzenbeek and Staff, Inc., 836 W. Hubbard St., Chicago, announce a new line of "junior" size angle drilling heads for close quarter work. The heads may be used directly on the flex shaft or on an extension of an electric drill. Universal, 30 degree, 45 degree and 90 degree heads are available; overall diameters are ½" or ¾". The design and construction are said to provide for heavy duty application.

with GAS TANKS sealed in a FIRE-KILLING ENVELOPE

HELL breaks loose when a tracer bullet meets gasoline fumes...*but not on our warplanes!*

In fact, when a tracer whizzes through the gasoline tank of an American battle plane, it's as if it buried itself in a sandy hillside. For this there are two good reasons...One *inside* the tank, and one *outside*. We guard both of these highly vulnerable spots.

The emptied gasoline tank is the dangerous one. Fume-filled, it needs only a spark to explode it. So Walter Kidde & Company provides a "vapor-purging system". The pilot yanks a release handle, bleeds Kidde carbon dioxide gas into the tank. Explosive gasoline fumes are carried away—and replaced by inert carbon dioxide gas, deadly enemy to flame and fire.

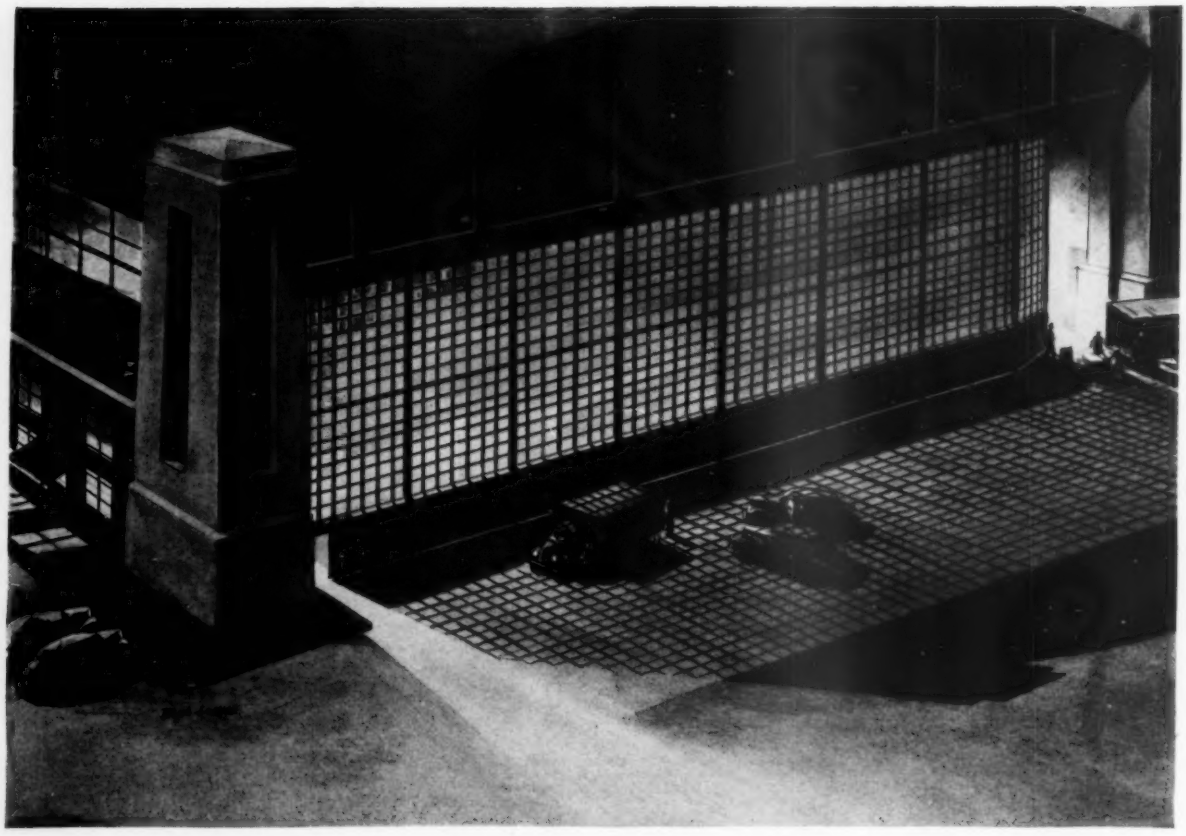
There's not much danger of a *full* tank igniting. But suppose a self-sealing tank gets punctured, leaks a little, and fumes fill the area between the tank and the outer skin. Won't a tracer explode this mixture, collapse the tank or damage the wing? It can. But it doesn't get the chance. There's another Kidde cylinder that pours carbon dioxide gas into this space, ready to snuff out the tracer if it hits.

Kidde, master of fire in the air and on the ground...expert in handling of high-pressure gases...is seeking new research assignments. If you have one, let us know.

Kidde (K Kidde)

Walter Kidde & Company, Inc.

1239 WEST STREET, BLOOMFIELD, NEW JERSEY



Inside Secret Hangars

When war came to the United States, the aircraft industry was prepared for action. Ready with superior equipment fully developed, the industry expanded quickly into quantity production, enlisting at the same time the productive capacity of other industries.

Behind this achievement lie years of perseverance and millions of brain-hours in research, engineering and development.

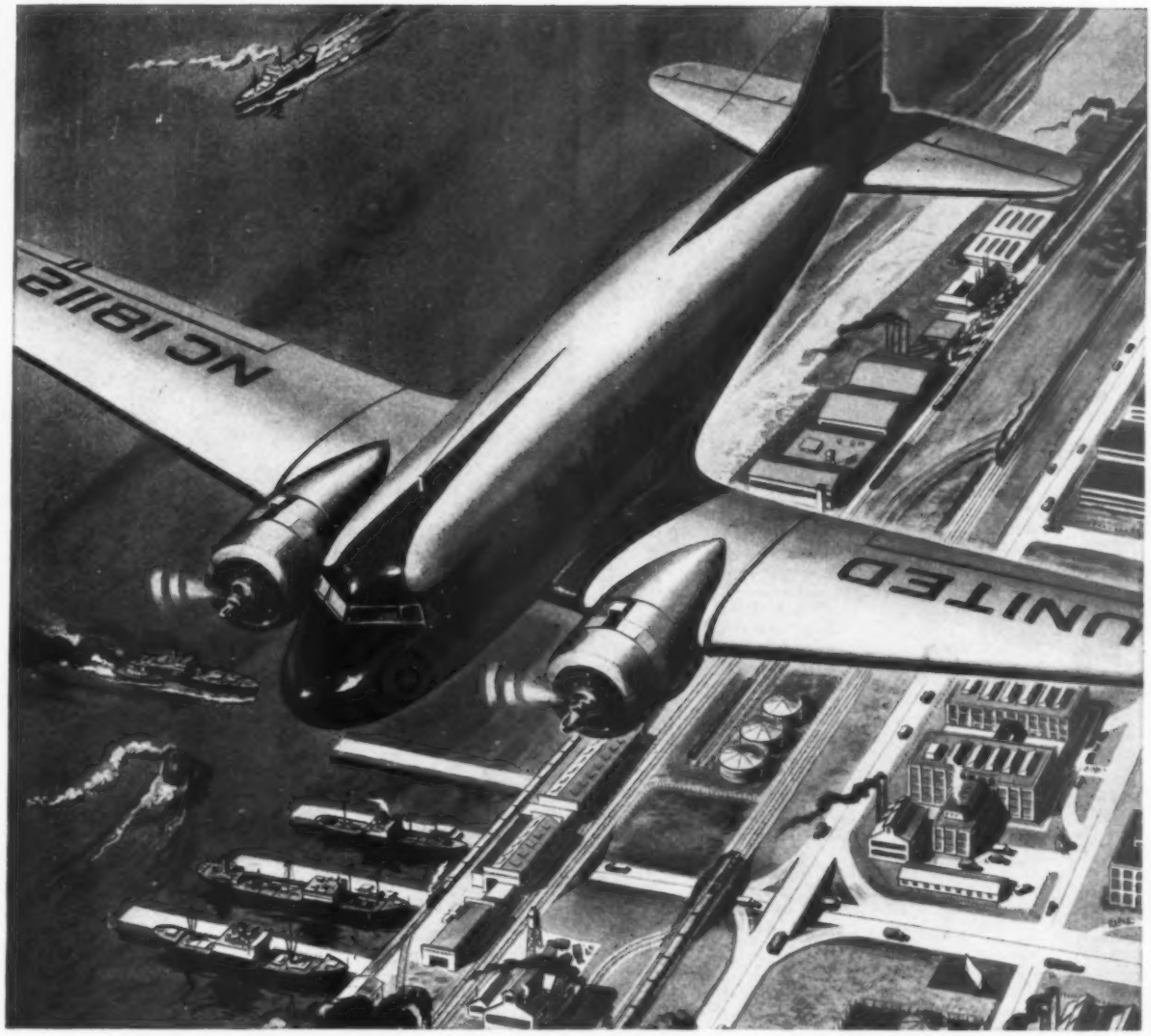
In this exacting work Vought-Sikorsky has long played a pioneering role. For 25 years its designers and engineers have periodically come forward with planes of advanced design that have led to outstanding achievements in military and commercial operations. Now, inside secret hangars, new types are taking shape that will help carry American air superiority to new heights.

VOUGHT-SIKORSKY AIRCRAFT

Stratford, Connecticut

ONE OF THE THREE DIVISIONS OF UNITED AIRCRAFT CORPORATION

XUM



A *Salute to Transportation*

We of United Air Lines are as proud of the job others are doing as we are of our own. And that goes for the other airlines, the railroads, the merchant marine, the bus and truck lines.

Naturally, we know more about our own industry than we do about the others in the transportation field. With fewer planes, the airlines of the country are maintaining schedules that compare favorably with peacetime ones . . . with operating standards at highest efficiency.

The saving of time is of incalculable value to the whole war effort. Thousands of key men, civilians as well as Army and Navy officers and Government officials, are saving priceless hours because they fly.

Not much can be told about it yet, but in addition to maintaining an extensive domestic transport system the airlines are flying cargoes and passengers to all parts of the world.

Much of the credit for the airlines' war achievements must go to their 50,000 men and women who are serving so vitally in saving time for the nation.

Theirs is a task that requires skill and judgment and experience. Like the men and women of many other war industries, they have an important job to do . . . and they are doing it well.

United Air Lines

UNITED AIR LINES

THE MAIN LINE AIRWAY

★ ★ BUY WAR BONDS FOR VICTORY ★ ★

Modification Centers Hold Key to Mass Output, Officials Believe

THE Army Air Forces for months has been conducting a crucial program whose maximum success may bring the aircraft manufacturing industry closer to mass production than has ever been considered possible in the past.

The War Department's Bureau of Public Relations is now permitting publication of the more important aspects of the procedure being followed by a system of aircraft modification plants which are scattered throughout the country, with several outside the borders. Details, however, must remain unexplained at this time.

It has been general knowledge for some time that modification centers have been established, but the public's impression has been that changes were superficial, or that planes were merely furnished with special but light equipment for better operation in the area to which they were to be assigned. These were thought to be special filters for desert use, or cold-weather gadgets for Alaska.

In the opinion of Washington observers, however, the modification center plan may make it possible for airframe companies to produce uninterruptedly with changes in every 500 or so planes, for example, instead of continual adjustments or revisions to meet war demands, leaving most such operations up to a special plant.

Industry officials are not convinced yet that military planes will ever be anything but tailor-made as to types, but they naturally watch the progress of the program with keen interest.

They also express the opinion that the permanent nature of many of the dies, jigs, and other equipment in the Ford Motor Co.'s Willow Run plant, which will produce Consolidated B-24s, will either prove or disprove the elaborate modification theory once and for all. The significance of the Willow Run record will not be underestimated by either the oldline aircraft industry or the converted automobile industry.

The American Society of Mechanical Engineers, in calling attention to a reference to the program, describes it as "a revolutionary practice of incorporating in planes, after they have left the assembly lines, changes which have been found to be essential under actual combat conditions."

The War Department permits writers to refer to "several dozen" of these modification centers in the U.S., some conducted by the aircraft manufacturers themselves, others by leading airlines, and still others by the Army at its maintenance stations.

In mid-November the contracting firm of Bechtel-McCone-Parsons Corp., of Los Angeles announced a Defense Plant Corp. arrangement for a $12,500,000 modification plant to be constructed in Alabama, described as "the largest facility of its type in the U.S. with a capacity to handle several times the output of other similar plants located throughout the country." The Defense Plant Corp. also issued an announcement in Washington.

Maj. Nathaniel F. Silsbee, AAF, in an address before the ASME in New York Dec. 2, referred to the modification plants briefly, pointing out that Nazi Germany made the mistake of freezing designs on the Messerschmitt 109 single-seater fighter and the Junkers 87 (Stuka), to insure quantitative superiority, but the battle of Britain taught them their lesson and production changes are now coming through on all models more quickly.

The modification center, the American substitute for production changes permitting up-to-the minute developments to be incorporated in combat aircraft without interrupting the flow of production, may be the solution for a vital problem, with important repercussions in the future.

Kaiser Plans Post-War Plane

Henry J. Kaiser said in New York on Dec. 2 that he plans to develop a "flivver" plane for post-war use. "Don't forget there'll be a million boys coming back after the war—all of them air-minded," Kaiser stated. He said that the Kaiser-Hughes cargo planes are "coming along well."

Dowty Names Bruno

Dowty Equipment Corp., Long Island City, N. Y., has announced appointment of H. A. Bruno and Associates, New York, N. Y., to handle its public and employe relations.

Automatic Propeller Is Introduced by Wickwire Spencer

A new, fully automatic, variable pitch propeller, said to be capable of adjusting itself for maximum thrust under all flight conditions, has been put into production in the propeller division of Wickwire Spencer Steel Co., New York, N. Y.

"From take-off, through the climb, at all air speeds, at all altitudes, and under any flight conditions, the pitch adjusts itself automatically, instantaneously and smoothly," company stated to the press. In addition, "the Wickwire propeller decreases the take-off distance required, produces faster climb and results in a plane obtaining more air mileage per gallon of gasoline."

Put into production after repeated tests, the new propeller was described as of a special wood construction, and lighter, simpler and less expensive to produce than the conventional manually controlled variable pitch blades. Wickwire's engineers were understood to have spent two years on research and experimentation before releasing the automatic propeller for volume production.

Executive Staff: Executives of Summerill Tubing Co. who were present at ceremonies of awarding of the Army-Navy E to the company were, upper row, l. to r., E. L. Parker, president; G. P. Kraemer, secretary and treasurer; E. C. Van Orsdell, vice-president and plant manager. Lower row, l. to r., R. R. Lawson, executive vice-president; G. P. Parker, vice-president-sales, and J. P. Dods, director of research.

Brewster Sues James Work & Miranda Br

Brewster Aeronautical Corp. [illegible] a $3,200,000 suit in Philadelphia [illegible] eral District Court Nov. 25, [illegible] as defendants James Work, [illegible] time president and chairman of [illegible] company before he was ous[illegible] Philip M. Stephanson, a former [illegible] president, J. Griffith Boardman, [illegible] mer director, and Alfred J. Mir[illegible] Jr., Ignatius Miranda, and F. [illegible] liam Zelcer.

The money was paid in va[illegible] commissions on sale of airplanes [illegible] parts to foreign countries, and [illegible] plaintiff's counsel alleged that a [illegible] spiracy existed to defraud the c[illegible] pany. Specific charges were [illegible] directed at Boardman other [illegible] that he was on the board wh[illegible] with the officers of the old man[illegible] ment, failed to void the sales [illegible] tract with the Mirandas and Ze[illegible]

The complaint alleges that [illegible] Mirandas and Zelcer organized [illegible] Brewster Export Corp. as exclu[illegible] sales agent for the aircraft ma[illegible] facturer, and that the contracts p[illegible] vided for 10% commissions on [illegible] foreign business. The company p[illegible] $2,800,000 to the export firm, w[illegible] the Mirandas and Zelcer collect[illegible] $400,000 more in commissi[illegible] through the Hayes Aircraft Acc[illegible] sories Corp., a subcontracting c[illegible] cern also established by [illegible] Mirandas and Zelcer.

AMERICAN AVIATION reported i[illegible] mation of both sales companies [illegible] the time, using official records fi[illegible] with the Securities & Exchan[illegible] Commission.

The complaint contends th[illegible] Brewster Aeronautical Corp., co[illegible] have taken care of its own fore[illegible] sales operations. The Miran[illegible] owned about 50,000 shares, or [illegible] of Brewster stock, while Work a[illegible] his family held 100,000 shares, t[illegible] company's counsel, Arthur Littlet[illegible] asserted.

The Mirandas once served a te[illegible] in the Federal penitentiary at Lew[illegible] burg, Pa., for selling to a So[illegible] American country in violation [illegible] the now-repealed Neutrality Act.

Culver Stipulates with Fede[illegible] Trade Commission

Federal Trade Commission, [illegible] recent official statement, states th[illegible] Culver Aircraft Corp., Wichi[illegible] Kan., "engaged in the manufact[illegible] of airplanes designated 'Culv[illegible] Cadet,' and Russell J. Alley, a di[illegible] tributor, have stipulated with t[illegible] FTC to cease and desist from u[illegible] of the statement 'engineered to [illegible] G's' as descriptive of the airplane[illegible]

According to FTC, Culver an[illegible] Alley have also agreed to refra[illegible] "from use of that statement or an[illegible] representation of similar import, th[illegible] effect of which conveys the belie[illegible] that the ultimate load which suc[illegible] airplane is or has been designed t[illegible] sustain is in excess of what is actu[illegible] ally the fact, or which imputes to th[illegible] airplane a degree of safety, whe[illegible] operated, that is not warranted b[illegible] the designed strength."

Sighted Fortress—built same

THIS young sharpshooter is lining up a wing jig for a Flying Fortress.*

From where he stands (in the wing shop of the Boeing Seattle plant) he can see that the wing of the big B-17 he is helping to build is going to be straight and true. He can see that this Fortress, like the ones that went before it, is going to be very bad medicine for the Axis.

Wing jigs are the "forms," the giant tools, in which the wings are built. The Boeing jigs are three stories high, built of steel tubing. They are big enough for large crews to work freely on each "floor." They are accurate enough to be adjusted to 1/1000 of an inch.

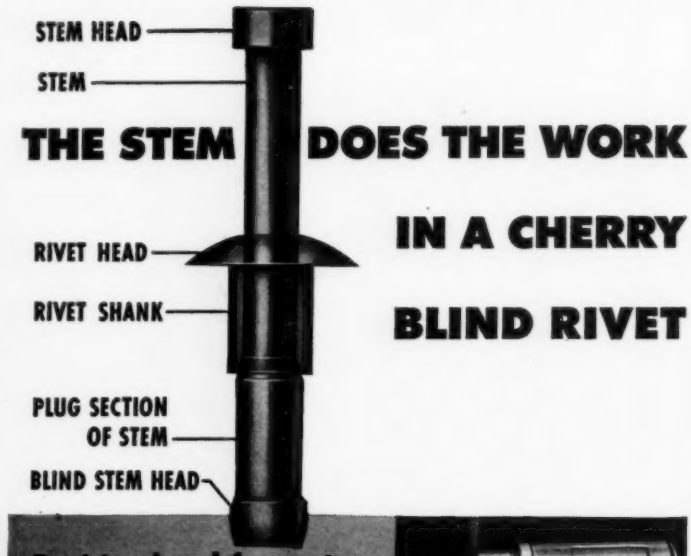
Jigs are tools, and the Boeing jigs are part of the more than 200,000 special tools and machines designed by Boeing tool engineers, and built by Boeing technicians, for the swift, smooth-flowing production of Flying Fortresses and other war planes. It is the combination of these tools, plus the men and women who use them, that won for Boeing the signal honor of being selected as the first aircraft manufacturer to receive the new Army-Navy award for efficiency.

There are several thousand engineers now at work in the Boeing plants. Their know-how ranges over the whole field of engineering. They represent more than twenty-five different kinds of engineering skill. Whether they are designing a wing for a new airplane, a spiral staircase for a Clipper, or a machine that will turn out parts 20—50—100 times faster, Boeing engineers bring to the job an understanding that it must be a better job than ever has been done before.

The designing of tools and machines with which to build new kinds of equipment . . . for war and peace . . . is only one of the many projects that form a constant part of the Boeing engineering schedules at Seattle and at other plants in the Middle West and Canada.

DESIGNERS OF THE FLYING FORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

*THE TERMS "FLYING FORTRESS" AND "STRATOLINER" ARE REGISTERED BOEING TRADE-MARKS



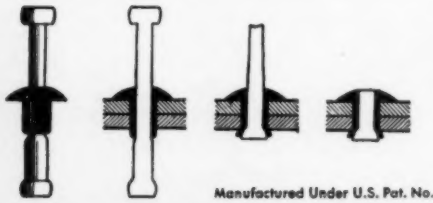
THE STEM DOES THE WORK IN A CHERRY BLIND RIVET

Positive head formation and shank expansion produced by rivet stem. No bucking bar needed

The Cherry Rivet is designed to do a first class riveting job in the blind or hard-to-get-at places in aircraft structures. This rivet is actually an assembly, consisting of a standard aircraft rivet which has been drilled and through which passes an aluminum alloy mandril or stem.

SPECIAL GUNS USED—The rivet can be placed in the work first or the projecting stem can be placed in the gun head and then inserted in the work. The gun may be either a hand-operated or power tool. (Head of the G-15 Pneumatic Gun is shown above.) In either case the gun pulls on the stem and pushes on the rivet head. As the stem is pulled through the rivet it forms a tulip head on the blind side, expands the shank of the rivet and permanently plugs the rivet. The pull continues until the stem breaks and frees the gun. The stem is then trimmed flush with flat ground nippers.

FAST OPERATION—Cherry Rivets can be applied at the rate of 800 to 1600 per hour depending upon the type of rivet used. They give satisfactory performance with reasonable tolerances in grip length and hole size. Complete instruction on Cherry Rivets and their application will be furnished on request.



Mandril in the self-plugging Cherry Rivet, when pulled by special gun, forms tulip head, expands rivet shank, permanently plugs the rivet and then breaks, releasing gun. Mandril is trimmed flush.

Manufactured Under U.S. Pat. No. 2,183,543 and other Patents Pending

Cherry Rivet Company
LOS ANGELES, CALIFORNIA

Total Planning Needed

(Continued from page 46)

few, if any. To our knowledge the new German Templehof represents a well-above average *plan*. Yet located in this country, *it* would offer no over-adequacy for the future.

The seat of the trouble seems to be that those delegated today to head the development, design and construction of 1,000 and 1,500-acre airports have not even the slightest idea what the function of the airport is. There are no parameters for service area to operating area ratios, etc. As a matter of fact, the tendency seems to be toward neglecting provision for service area entirely. The distance between current airport design and functional integrated planning of field development is so great as to make future prospects very grim. Whether this disparity is a result of political imposition or undernourishment of the art itself, we will let the reader decide.

However, common sense demands that our program include the receptive attention of airport design specialists. Not that anyone wishes an airport built around any specific aircraft types that may be discussed; but that the specialist may know: (1) what it is that his design is to accommodate; (2) what he must provide for in those accommodations; (3) how, in a functional sense, his component fits into the entire air transport picture.

Expandable Solution

Given the problem with its specific functions and its variables, he should present an *expandable* efficient solution consistent with the standards and practices of his profession. His collaboration with lighting engineers, blind flying specialists and the like can become extremely hazardous without the advantage of the collaboration on such a program. Whether by utilizing airport engineers from the airlines' staff, where practical, we would be inviting a too-close-to-the-forest condition is a moot point. The advantages of such a move are apparent.

The role of the handling and servicing equipment engineer is relatively new. Its importance, we think, goes up roughly as the square of the gross weight. His "collateral engineering" (as Whiting's Herb Anderson calls it) will ultimately be with the aircraft manufacturer and the airport designer to the final advantage of the airline operator. Aircraft design modification to simplify equipment functions and equipment design features to complement aircraft efficiency, at least in ground time, are the bases for his following the project with the manufacturer and the operator from the specs stage. By over-the-shoulder observation of the operator's problems, possibilities for joint solution are enhanced.

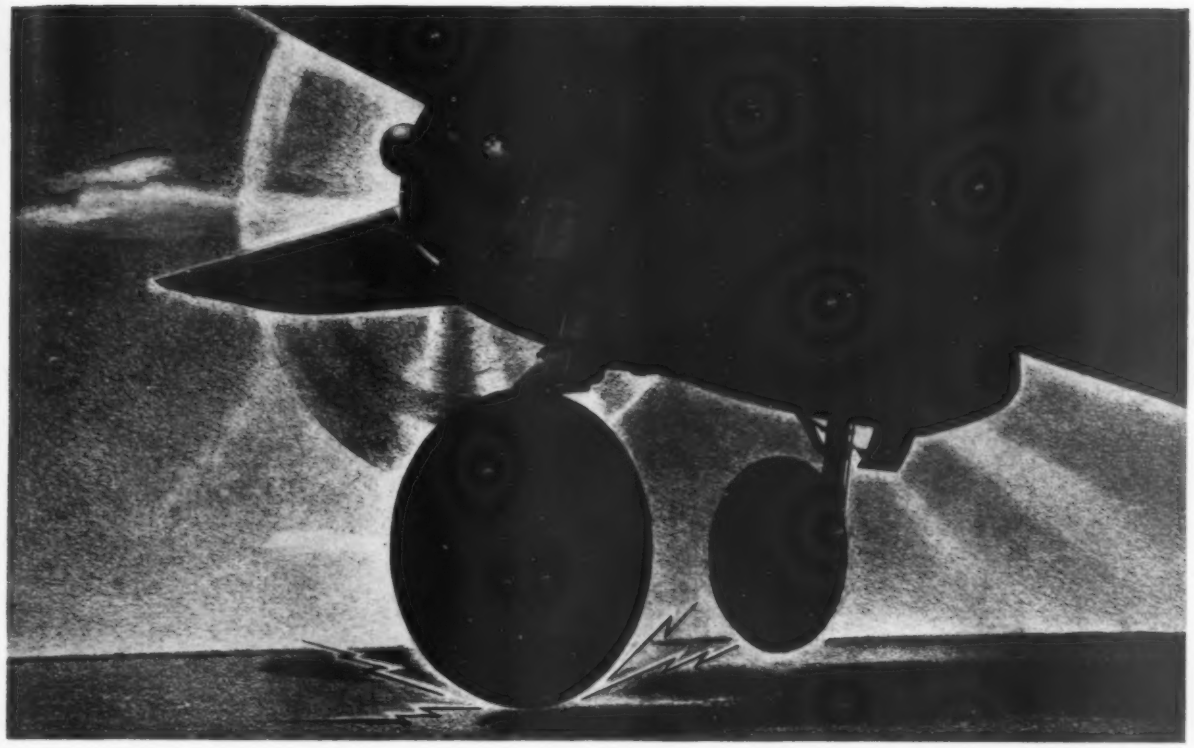
The connection between equipment engineer and airport specialist becomes more close as aircraft size increases to the point where equipment in part becomes a fixed p of the service area (terminal hangars) of the airport. Trac gear, cranes and jigs all come this heading. While certain equipment engineer's problem exclusively solvable in the li one specific aircraft design, it s be understood that flexibility prime criterion in those sol which involve the detail desig the airport proper.

Our final factor introduces production expert, a stranger to most of the phases of air t port operation. In the mind many air transport executive should remain a stranger t field. Personally, we see no for a pointless period of "effic experting," but we are conv that the industry can learn muc introducing itself to certain duction techniques by, in our gram, introducing production e to the functions peculiar t business and by cooperatively ing such practices where the appropriate.

Recognizing handling and tenance as a major field for tion application, the course o production engineer becomes clear. Coming on the stage "cold would logically absorb from operator a wealth of inform on how we did it *then*, the ti took us to do it *then*, the tool needed to do it *then*, etc. He have to be indoctrinated in whole airline picture. His conta an observer in the operator-m facturer stage of the program give him added data on weakn of design, airline require transport aircraft functions Without good grounding in air portation, he might easily and consciously run amuck and m the future of the relationship active participation with equip engineer and airport designer self-evident necessity. It is not possible that our production w be one and the same with the e ment manufacturer. Whether setup would permit maximum ciency of both phases is a poi discussion. The problems of air public and work flow as conn with building location, equip line-spotting, etc. are the "meat these three-way production-air equipment sectors of our prog The production man must remem that this is not a model-a-year gram. Flexibility is the keyst

We have presented above an ide istic situation and offered it as aid to integrated planning for future of the air transportation dustry. We realize that applica of part or all of our ideal solution practical cases offers problems necessitates compromises. Yet s concerted, balanced program o tion is necessary or the "perf aircraft of the future will be w elephants for lack of thought plan toward minimizing ground and making speedy disposition aircraft when out of their "pr able" element.

XUM



GROUNDING "CHAINED LIGHTNING"

PLANES couldn't fly without electricity but they could well do without the static they pick up in flight. For when they sit down on rubber tires, natural insulators, this chained lightning can't "ground"—*can* cause trouble.

In some cases static has piled up sufficient force to knock down the ground crew who touched the plane. Wires dragging—like the chains on gasoline trucks—have been tried but this wasn't too satisfactory.

Then they tried the new U.S. Royal "Static Ground" tire for tail and nose wheels. Result: no more static trouble.

The tread on this new Static Ground tire is made of special conductive rubber that releases the static charge as the tire makes contact with the ground. Inquire about this new U. S. Royal Static Ground tire. It's available in both nose wheel and tail wheel tires. If desired, it is available in U.S. Royal Smooth Contour landing wheel tires, too.

ROYAL AIRPLANE TIRES

ONLY "U. S." HAS THESE EXTRAS

1 **TEMPERED RUBBER TREAD**—A tougher, scuff- and heat-resistant tread compound for airplane tires.

2 **SAFETY BONDED RAYON CORD** — A lighter, more resilient, airplane tire material with tremendous impact resistance and stamina at high temperatures.

3 **FIELD AIRPLANE TIRE SERVICE**—A force of "U. S." field engineers in every part of the country is promptly available for engineering and technical help on tire and undercarriage problems.

4 **"U. S." ICE GRIP TREAD**—A tread of revolutionary design and performance for snow- and ice-covered landing surfaces.

5 **STATIC GROUND CONSTRUCTION** — Conductive rubber construction grounds static electrical charges upon contact with the ground. This safety feature is available in every U. S. Royal Smooth Contour and auxiliary wheel tire.

RAYON IN EVERY "U.S." TIRE — A "U.S." TIRE FOR EVERY PLANE

UNITED STATES RUBBER COMPANY

AIRPLANE TIRE DEPARTMENT • 6600 E. JEFFERSON AVE. • DETROIT, MICHIGAN

Allison Issues Press Report To Combat Engine Criticism

In an effort to combat criticism of its liquid-cooled aircraft engines, Allison Engine Division of General Motors Corp. has issued an exhaustive paper on the fundamentals of aircraft engine design, written for the layman with a minimum of technical terms.

The report mentions no specific type of airplane, omits any reference to radial engines or to competitive makes of liquid-cooled engines, and merely explains the fundamentals of liquid-cooled types in relation to the problems of aircraft design and the jobs which must be carried out by various types of aircraft.

Noteworthy is the preview distribution by the Aviation Writers Association. In a letter to members accompanying the report, Sloan Taylor, AWA president said: "The report has been checked by impartial AWA members for technical accuracy and is considered to be informative and accurate without any bias unduly favoring the product of the manufacturer releasing the report."

It is especially notable for its readability, it being one of the few explanations of aircraft engine design understandable to the average man. Of particular interest is the section on altitude performance. One evident purpose of the report is to prevent outright inaccuracies from appearing in newspaper stories.

The conclusions of the report follows:

Fighter aircraft have *various* important missions to perform. Some missions require planes that can fight well at high altitudes, some at medium altitudes and some close to the ground.

It is impossible to design one plane that will have the maximum of all requirements for superiority in every mission.

It is possible to provide a power plant that is effective at *all* altitudes but the size, weight and complications necessary to accomplish this result offset the advantages in horsepower gain when the plane must operate in the lower altitudes.

Global warfare involves a wide variety of climatic and tactical situations. The United States dares not be without a *complete* line of planes that can meet these varying conditions. It must have the low fighters for attack as well as high fighters for defense and they must be able to operate in heat or cold, dust or damp.

Basic engines can be the same in all these planes. But, the complete power plants will vary because it is necessary to vary the auxiliaries, such as supercharging, that must be added to the basic engine in order to preserve the greatest possible amount of power up to the altitude at which the plane designer sought maximum performance for the ship.

In evaluating the engine it must be remembered that it fundamentally is a package of horsepower in the plane designer's hands. He can use it to fly high or low; carry more weight or gain speed and climb; or a number of other alternatives. If he takes one he cannot have the maximum of the other.

This country has fully developed the basic engines and the auxiliaries necessary to provide this power plant performance at whatever altitude and for whatever duty the Army or Navy specifies, and they are good *the world around*.

Care must be taken in attempting to evaluate fighter aircraft to insure that the basis of comparison with enemy or allied craft is the same. No fair comparison can be made unless it is of planes designed for the same mission under the same world-wide conditions. It is inaccurate to compare the high altitude performance of a high altitude fighter with the high altitude performance of a ship designed for low altitude work and vice versa.

There must be attention to such details as rating horsepower on an exactly comparable basis. For instance, British and American methods of rating are not the same. Unless the exact basis of the rating is known there is danger of coming out with highly erroneous conclusions.

Account must be taken of *all* the factors in a plane's ability to perform a given mission. To single out one or two in which an enemy—or an American—plane may be superior and ignore the eight or nine other vital factors in which it may be inferior inevitably will result in a distorted conclusion.

The fallacy of comparing the latest design in Europe with last year's production model in America is evident. There may be flying in the United States at that very moment a plane that is far superior to the European plane, yet unannounced because of the military advantage of saving it as a surprise for the enemy.

It would seem sensible not to be too elated when there is sudden news of American superiority in one type of plane because the enemy probably has a new ship in this particular class "just around the corner."

By the same token, it would seem wise not to be too downhearted or violently critical when there is word of some temporary enemy advantage in a certain field. This is truly a technical war and there appears little likelihood that either side is going to be able to freeze on one set of plane designs for very long.

In the final analysis, the box score counts.

Visits Goodyear: Gill Robb Wilson, left, president of the National Aeronautic Association, recently inspected the blimp assembly line at Goodyear Aircraft's Ohio plant. Accompanying him on his inspection were T. A. Knowles, center, sales manager, and Comdr. C. V. S. Knox, inspector of naval aircraft.

Planes' Value Equal to Top Auto Outp

The disclosure of aircraft pr tion methods by the aircraft panies to automotive conc "ranks at the top of unselfish tributions made by American try to the job of victory," G Romney, managing director o Automotive Council for War duction, told the manufacturing industries committee of the Angeles Chamber of Commerc

Pointing out that the aircraf dustry reached "a monumenta cision" in subordinating indiv interests for the welfare of the tional war program, he said: cause of the nation's need they aircraft companies) decided to get about trade secrets, forget individual company and ind self-interest, and school the motive companies in the produ of airframes and aircraft engi

"The American aircraft ind has engineered, designed and into production and delivered t fighting forces a more ver force of fighter planes than th any other nation, Axis or Al Romney said. The germ of eration that began in aircraft spread by the automotive ind when the Automotive Council War Production was formed added.

Romney shed considerable on the volume of aircraft wo automotive plants, and on D the Council of which he is aging director released a giving additional information.

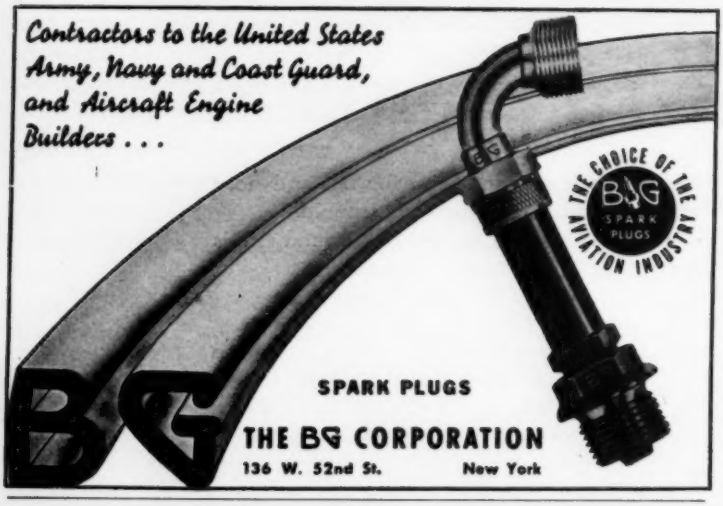
Particularly noteworthy in *figures was his statement that estimated dollar value of air production for this year will equal to the highest annual d value of automotive productio the more than 40 years of the dustry's existence. About 75% the work done will be by air companies, and 25% by automo companies, he said.*

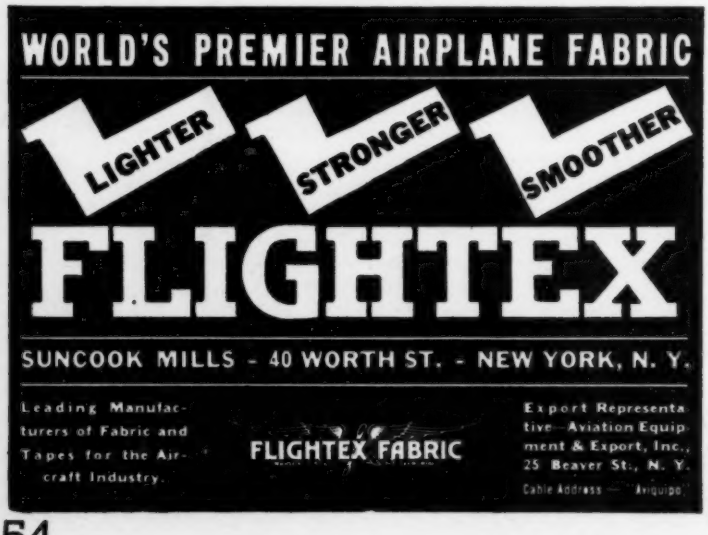
Fifty per cent more employe now directly engaged in air production than were normally gaged directly in automotive duction. "These are fabulous complishments for an industry was amazed in the Fall of 19 the suggestion that national mil aircraft capacity be increase 10,000 airplanes a year, a plan did not materialize because gress refused to authorize the duction of more than 5,000 for

The Council's report said in h

The automotive industry's di eries of aircraft, fuselage sec engines, propellers, and parts equal in dollar volume to 50 sq rons of warplanes, each consis of 15 heavy bombers and 30 dium bombers and 90 fighters addition it is producing enorm quantities of ground service marine equipment.

Altogether it adds up to a tot nearly $20 millions of war goo day—or a current annual rate o billion, 75% above the dollar of the industry's best peacetime


Contractors to the United States Army, Navy and Coast Guard, and Aircraft Engine Builders . . .
THE CHOICE OF THE AVIATION INDUSTRY
B&G SPARK PLUGS
THE B&G CORPORATION
136 W. 52nd St. New York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Destruction must arrive on time!

THE luxury of a second guess is seldom afforded in battle. That's why on-time arrival of critical war materials must begin on the production lines and carry through to the attack. Men and women production fighters at **Rohr** are teamed up with the battle forces of the nation on every front where **Rohr-equipped** planes fly. Day and night, seven days a week, **Rohr** workers fight -- not to meet, but to ***beat*** production schedules . . . to help give America ***more*** planes ***faster.***

"-- it ain't the individual nor the army as a whole, but the everlastin' teamwork of every bloomin' soul"

Rudyard Kipling

ROHR

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CORPORATION

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★ Resourcefulness in meeting new problems is only one of the qualities that have enabled Parks graduates to win positions of responsibility in commercial aviation.

Parks training develops their capacity for independent reasoning; gives them a background of basic principles that stimulates thought by teaching the *why* as well as the *how* of what they do.

If you are seeking men who are equipped to rise beyond their first job — to contribute much to the development and success of your industry — a letter to Oliver L. Parks, President, will bring information on available graduates.

PARKS AIR COLLEGE, Inc.
East St. Louis, Illinois

400-Passenger Plane Planned by Consair, Girdler Reveals

CONSOLIDATED Aircraft engineers are working on an airplane that could span the Atlantic in a few hours carrying 400 passengers and a crew, Tom M. Girdler, chairman of the boards of Consolidated and Vultee, said in New York on Dec. 3.

Girdler told the New York Chamber of Commerce that "the same minds that conceived our B-24 Liberator bombers and the PBY flying boats have planned this greater airplane to the point where industry could begin production on it. And it could be used as a bomber or in modified version as a cargo transport.

"It could span the Atlantic in a few hours and carry a crew and 400 passengers. As a bomber it could make non-stop trips to Europe and return. As a cargo transport it could carry heavy loads of vital armament and military supplies to distant fronts where sea-lane traffic is too hazardous.

"The speed of some 300 miles an hour, which amazes today, will soon seem slow. Tomorrow speeds of from 400 to 500 miles an hour will be common. Planes like these will help keep America supreme in the air."

Aviation Firms Now Employing 115,000 Women

The rate of feminine hiring is believed to be exceeding that for men in the aircraft industry, the Aeronautical Chamber of Commerce, reports in a survey showing that at the end of November there were approximately 115,000 women employed in shop jobs by aviation manufacturing companies.

Thus the number of women has increased by 2575% in a year. At the beginning of the war in 1939 about 2,000 shop women were on aviation manufacturers' payrolls. In Nov. 1941 the total had reached 4,300.

"During 1943, it is estimated, approximately 30% to 35% of all employes hired in the industry will be women," the Chamber says.

"Some plants report a minimum hiring age of 18, with preference given to women over 21. Other personnel directors have expressed a preference for those between 25 and 40. A majority of the airframe, engine and propeller plants have training schools through which women may progress from the unskilled jobs to better-paid positions.

"At the plant of one eastern engine firm, young women now account for 85% of the trainees. At a nearby aircraft plant only 30% trainees are men."

Not included in the Chamber report, however, is the typical comment of a plant personnel manager that women do not stay in one job as long as the average man, resulting in a huge turnover of workers at many companies, rising as the proportion of women rises. Many women are wives of military and navy men who are willing to remain employed only as long as their husbands are in the vicinity.

Bomber Sections, Gliders, Now Fill Old Auto Plants

Use of two former and partially idle automotive woodworking plants for manufacture of transport gliders and sections for a bomber is reported by the Automotive Council for War Production.

First model of the glider, produced in a plant used before the war for making station wagons, was said to have been "successfully test flown and given approval by the Army."

In the other plant, after changes were made in machinery and equipment adaptable to the new production requirements, operations on construction of the bomber sections are proceeding "at greater capacity and with far more employes at work than ever before."

H. L. Harvill St... Die Casting F...

H. L. (Red) Harvill, wh... last July from the presidency ... craft Die Casting Corp., Los ... Cal., has announced his re... into the aircraft die casting ... head of his own firm, the H. ... vill Co.

Associated with Harvill ... new venture are R. C. Beck, ... gineer; ... Oswa... manent ... desig... Gleason ... allurgist; ... Norton, ... foreman; ... Johnson ... manager. ... M. C. ... fellow ... chasing.

Harvill

Accord... announce... much of the equipment insta... Harvill's plant in Los Angeles ... non) was designed by Harvill ... self. Production is now in ... on "both dies and permanent ... castings of non-ferrous alloys ... stallations are said to include ... ment "for the production ... casting dies and permanent ... for pressure castings, cer... castings, permanent mould ... and die castings," as well as ... ery for special custom castings.

New Engine Testing ... Method Announ...

A new method of testing and ... ditioning aircraft engines, ... makes possible simulation of ... variety of flying conditions, has ... announced by Minneapolis-Ho... well Regulator Co., Minne... Minn.

"Definite control of the entire ... gine-testing sequence can be ... aged by one man from a single ... trol point," company claims, ex... ing that in the test cells, "it is ... sible for the testing engineer ... simulate all of the varied condi... the motor might encounter whe... ing from 1,000 to 40,000 feet and ... the heat of the tropics to the ... freezing temperatures of the ... . . ."

Within the test cell, which Min... apolis-Honeywell describes as ... tremely complicated," various ... lines, oil lines, air ducts, th... controls, temperature and pre... meters, and all the wires and ... needed to start and control ... motor, are permanently attach... connections in the cell itself. ... are remotely controlled from ... attending engineer's station o... the cell. A practical feature of ... testing arrangement is that the ... peller shafts are connected to ... tric generators to supply addi... power for the manufacturing ...

Harrower Joins Agency

Clinton R. Harrower, form... aviation editor of *The Wall St... Journal*, has joined the staff of B... Forbes, Inc., New York, N. Y., ... vertising agency, where he ... engage "in special activities ... United Aircraft Corp."

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METEOROLOGY for SHIP and AIRCRAFT OPERATION
by PETER E. KRAGHT, Sr. Meteorologist, American Airlines

Written in straightforward language, this book handles winds and weather with full emphasis on problems of plane and ship operation. Beginning with basic facts about the air, the author continues with horizontal and vertical winds, and their accompanying weather, and a long section on fog and other low clouds. Instead of formulae, 21 practical, easy-to-read tables are presented. Added features are glossaries of winds and technical terms, and an 8-page photographic section of cloud forms.

Especially outstanding are the 155 illustrations prepared by the author which explain and clarify nearly every page of text.

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by CAPTAIN DAVID POLOWE

This book presents the 5 main problems of navigation in careful detail. The complete Dreisonstok (H.O. 208) Tables are included, and all necessary pages from the Nautical Almanac, so that no reference books are needed. It explains the use of the American Air Almanac, devotes chapters to dead reckoning, piloting, examination questions, etc.

528 Pages *Fully Illustrated* *$5.00*

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Every continent and sea is a battlefield. America and her Allies — on the ground, on the water and in the air—are fighting a life and death struggle on far-flung fronts.

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The Army Air Transport Command, the Naval Air Transport Service and the United States Maritime Commission stand shoulder to shoulder in getting this job done. Under this co-ordinated command, huge air and sea fleets have been organized and are speeding to the far corners of the globe.

American Export Airlines and American Export Lines, with giant, four-engine flying boats and new, fast cargo ships, are serving in this great battle of transportation.

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Incorporations

Illinois—**Knapp Flying Service, Inc.**, 801 West Washington St., Chicago. Airplane flight instructions, etc. Two hundred shares, common, n.p.v. Correspondent: Hart and Hart, Benton. Incorporators: T. P. Knapp, J. Fullop, Sr., and J. Fullop, Jr.

Michigan—**Consolidated Aircraft Corp.**, Delaware and Detroit. $2,400,000 common.

Michigan—**Majestic Aircraft Parts Corp.**, 3965 Jefferson, west, Ecorse. Deal in aircraft parts and tools. $50,000 common. John W. Parker and Richard A. Hoelzle, Detroit, and Richard H. Hoelzle, Ecorse.

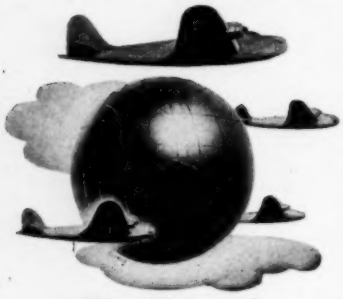
New York—**Transmo Corp.**, New York. Motors, aircraft, tractors, etc. 200 shares, n.p.v. Kurzman and Frank, 25 Broad St., N.Y.C

New York—**The Plywood Aircraft Corp.**, New York. Aircraft of all kinds. $20,000. Haggerty, Myles and Wormser, 60 E. 42nd St., N.Y.C.

Ohio—**Ohio Aircraft Fixture Co.**, Cleveland. To manufacture fixtures now made by a division of American Coach and Body Co., Cleveland. President, H. H. Warnsman.

Oklahoma—**Oklahoma City Aircraft Corp., Inc.**, Oklahoma City. Capital stock, $2,400. Oren L. Worthen, O. H. Leslie, C. W. Clift, Oklahoma City.

Virginia—**Calverton Flying Club, Inc.**, Calverton. To engage in local aviation activities. Maximum capital, $800. J. Watson Crittenden, president. Walter H. Robertson, attorney, Warrenton.



The Voice of
AVIATION

Radio and Aviation have grown hand in hand—dependent on one another! Pioneers in both fields realized that successful aircraft operation, in peace or war, demands efficient *communications*. Frank Melville has given his time and energy to the development of Melville Aeronautical Radio School because he foresaw that the nation would need a dependable source of training men and women in radio communications for America's planes—first for Victory, then for Progress.

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Plastic-Plywood Trainer

Successful completion of the first test flight of the AT-14, new plastic-plywood, bomber-crew training plane, was recently announced by Fairchild Engine and Airplane Corp., New York, N.Y.

This new bomber-trainer, said to embody "many advances in design over the original Fairchild AT-13 . . . announced several months ago," is designed like its predecessor to "train bomber crews to work as a team, a method . . . which has brought . . . success in actual war operations."

Capable of reaching 200 mph speed, the AT-14 is powered by two Ranger in-line aircooled 12 cylinder engines of 520 h.p. each, for take-off, and 450 h.p. at 12,000 feet. It has a wing span of over 53 feet, and is nearly 38 feet long.

In operation, this ship carries a load of 10 practice bombs of 100-lb. weight, and company claims "a useful load of nearly two tons can be carried in the plywood fuselage . . ." It is equipped with a new type of bombsight in its plastic nose, and has a machine gun in the power driven plastic gun turret. A camera can be interchanged for a machine gun in the turret "for testing the student gunner's precision," and "it can also be equipped with a camera for recording results obtained in practice bombing for reconnaissance work."

Consolidated To Set Up 12 Small Parts Plants

Announcing an unprecedented step to speed production and beat the manpower shortage, Consolidated Aircraft Corp. will open small parts plants in 12 California communities.

Describing the plan as an original step by taking the work to available labor, Harry Woodhead, Consolidated president, said the opening of small plants, under Consolidated management, where labor is available and distances are not too great to create transportation problems, marks the first time a prime contractor has set up its own subcontracting plants to speed warplane output. The company's production of Liberators, Coronados and Catalinas will be affected.

"Consolidated will lease available space in communities where labor, particularly women, is available," said Woodhead. "Experienced production personnel will be sent to each plant to train new employes where production will be confined to small parts.

"The move will also relieve further demands on housing and transportation problems in San Diego. By going into the communities not already taxed to the limit by war work we can insure a steady flow of small parts to the main plant.

"Each plant probably will work at first on a one-shift basis. Parts to be made at the plants will be those requiring the minimum of tooling and will augment the production at San Diego of such parts as electrical wiring installations, bench assemblies, etc." A survey by production men, and consultation with Federal labor officials preceded selection of the 12 communities.

Financial Bri

GRUMMAN AIRCRAFT ... ING Corp., Bethpage, L. I., ... nounces an indicated profit ... months ended June 30, 194... 558,944, before provision for ... of contracts and for Federal ... excess profits taxes. These ... compare with $747,218 in ... period last year.

AERO SUPPLY MFG. CO. ... Pa., has announced a year end ... of 35c per share on Class B ... ing the total current year's ... ments for this class 80c, equa... those in 1941. Regular quart... dend of 37½c per share on ... stock has also been declared.

WESTERN AIR LINES, ... bank, Cal., reports profit for ... months of 1942 of $502,835.67 ... on each of 409,954 shares ou... based on "unaudited figures." ... of $254,080.59 was made for ... Federal income taxes. In ... period of 1941, WAL's profit ... 661.80, after provision of $4... Federal income taxes. Corp... tributes increased earnings to ... pacity loads on all flights."

AVIATION Corp., New York, ... directors on Nov. 19 declared ... of 15c on stock outstanding, ... Dec. 21 to holders of record No...

GLENN L. MARTIN Co., Ba... Md., board of directors on Nov. ... clared dividend of $1.50 per sha... mon, payable Dec. 21 to holders ... ord Dec. 11.

MURRAY CORP. of AMERIC... troit, Mich., independent audit fo... year ended Aug. 31, 1942, sho... profit of $1,400,948, or $1.47 on ... 950,615 common shares, after pr... of $775,000 for Federal income ... and other obligations, and rese... $250,000 for post-war adjustment... compares with net profit of $1,... or $1.69 during the 1941 fisca... when $555,000 was provided for ... income taxes.

BREEZE CORPORATIONS, Inc., ... ark, N. J., directors have voted ... dend of $1.50 a share, payable D... to holders of record Dec. 1.

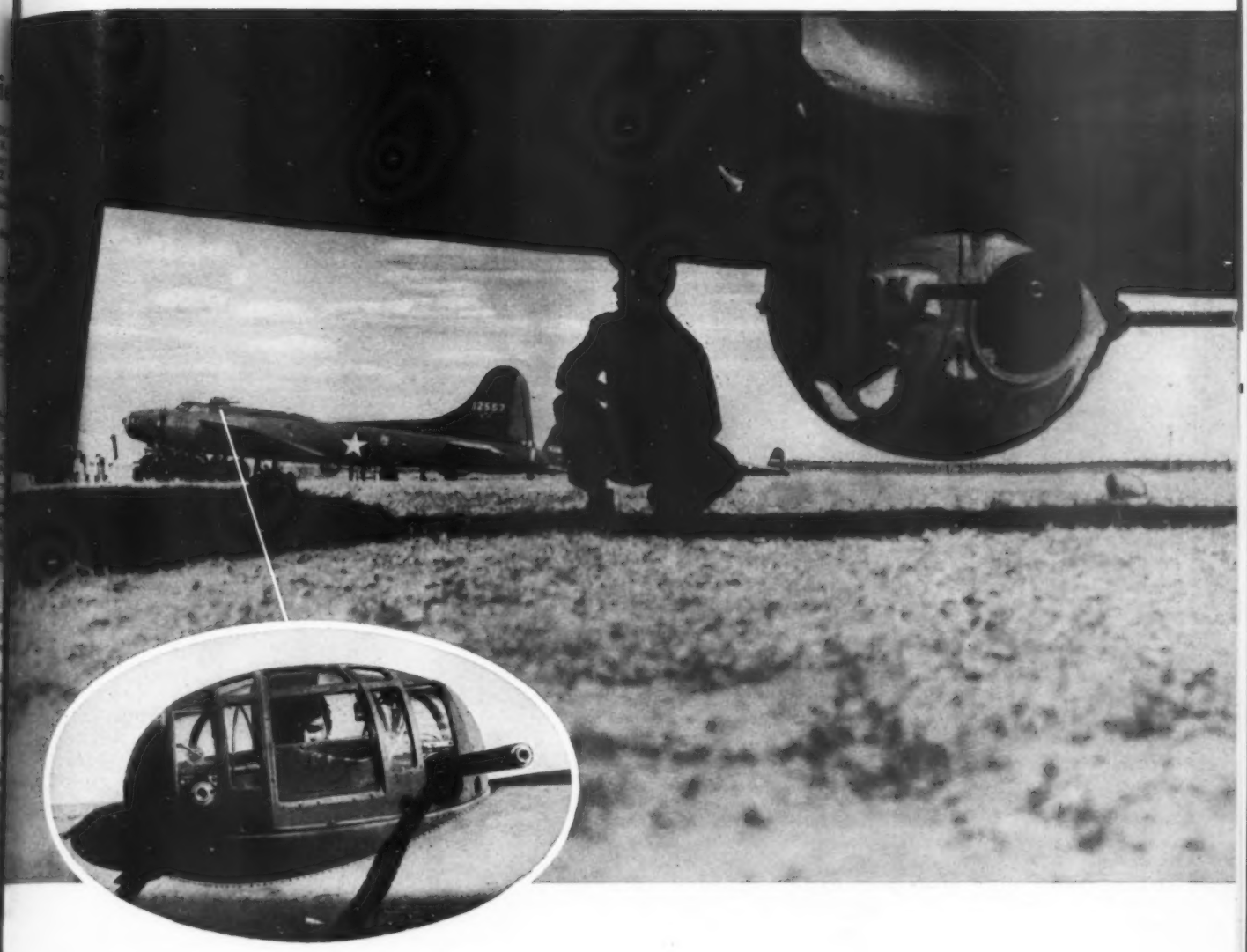
NATIONAL AVIATION Corp., ... York, N. Y., is reported in the ... to have voted a dividend of 50... able Dec. 15 to stock of record N...

UNITED AIRCRAFT Corp., East... ford, Conn., directors have decl... dividend of $2.00 on each sha... common, payable Dec. 15 to st... record Dec. 1, according to press ...

CONTINENTAL MOTORS Corp., ... kegon, Mich., advises that its di... on Nov. 25 declared dividend ... a share common, payable Dec. ... holders of record Dec. 4. Also ... announced that holders of U... no-par value and the old $10.... value common capital stock, issue... dated prior to Oct. 25, 1935, w... required to exchange their certi... share for share, for the present ... par value before receiving this div...

Franklin
FINE AIRCRAFT ENGINE
★ AIRCOOLED MOTORS CORP., SYRACUSE, N.

XUM



Knights in Armor

Over Europe, in Asia, in Africa, in the South Pacific and in the Aleutians, American Flying Fortresses are smashing the enemy at every turn. This long-range, high-altitude bomber is wearing something new—something that has given it remarkable *defensive* ability—even when fighter escort is lacking.

This great offensive airplane now wears a coat of mail in the true manner of the knights of old. Deadly defensive blows from the "belly bubble" and its companion upper turret protect this modern knight in reaching his objective, raining havoc on the enemy, and returning to base. Every angle of attack is covered by machine-gun fire from these precision power-controlled Sperry turrets and the Boeing "stinger" in the tail.

A product of Sperry laboratories, the development, design, scientific investigation and engineering of both the upper turret and the lower ball turret were accomplished a full year before Pearl Harbor. At the outset of hostilities other manufacturers, under license, were soon able to take over the production, and quantities of this vital equipment are now flowing from their assembly lines.

Sperry Gyroscope Company, Inc.

BROOKLYN • NEW YORK

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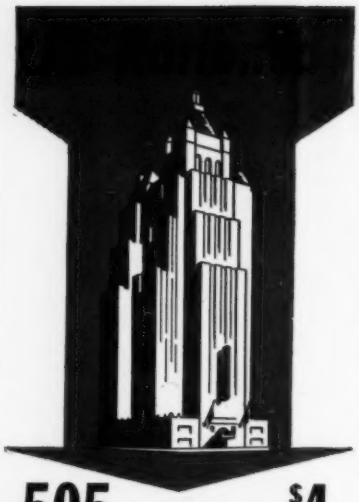

505 ROOMS AT $4

At The Lexington there's no necessity to ration minimum-rate rooms! For, more than one-half the total number of rooms in "New York's Friendly Hotel" are, now as before, priced at $4 ... all outside with combination tub and shower, circulating ice-water, full-length mirror and four-station radio.

Home of the famous Hawaiian Room

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DAYTON, OHIO

On the Labor Front

ALUMINUM COMPANY OF AMERICA, INC.
Strike vote is threatened unless women workers are paid the same ... The dispute between company and International Die Sinkers Conf... wage increase demands is certified to NWLB. The War Labor Boa... appointment of an arbitrator to handle grievances which cannot be ... under procedure in the union's present contract.

BENDIX AVIATION CORP., South Bend, Ind.
Controversy with UAW-CIO regarding wages, classifications of emp... equal pay for women workers is certified to NWLB by Secretary Per...

CUNO ENGINEERING CORP., Meriden, Conn.
Company has granted plant-wide wage increases. According to labo... some of these are as high as 35c an hour.

CURTISS-WRIGHT CORP.
IAM-AFL demands at Buffalo and Columbus plants is certified to ... Propeller Division plant guards at Clifton and Caldwell, N. J., vote for ... Labor Union-AFL.

EASTERN AIRCRAFT DIVISION, GMC.
Company is directed by NLRB to hold election. Wood pattern mak... apprentices will vote for Pattern Makers League of North America—A... UAW-CIO, or neither.

ENDICOTT FORGING & MANUFACTURING CO., Endicott, N. Y.
NWLB directs company to give skilled workers an average increase ... retroactive to Aug. 4, bringing average rate for skilled workers to ... hour.

FORD MOTOR COMPANY OF CANADA
Workers in three plants at Windsor went on strike in protest against ... women at a wage less than that paid men. Plants reopened after ... days upon agreement that for the present, women will not be empl... production jobs and jobs now held by women will be classified to de... which, if any, are production groups.

GENERAL MOTORS CORP., Detroit, Mich.
Delco Division, Dayton, O., is advised by NLRB of certification of UER... for plant protection employes. Union demands (UAW-AFL) over wa... union security at plants at Meriden, Conn., & Fisher Body at Kans... are certified to NWLB. Management of the plant at Baltimore, Md., ... vised by NLRB that petition filed by UAW-CIO has been dismissed.

GOODYEAR AIRCRAFT CORP., AKRON, O.
UAW-CIO, at its request, is removed from the ballot for the scheduled ... among employes for bargaining representation.

HARRISON RADIATOR DIVISION, GMC, Lockport, N. Y.
Company has signed an agreement with employes providing a 10c ... increase.

HUGHES TOOL CO., Houston, Texas
NLRB orders an election among production and maintenance empl... vote for USW-CIO, for Independent Metal Workers Union, or neither.

KILGORE MANUFACTURING CO., Westerville, O.
Election directed for production and maintenance employes by NLRB ... for or against bargaining representation by United Mine Workers.

LEACH RELAY CO., Los Angeles, Cal.
NLRB orders company to withdraw all recognition from Relay E... Association and cease giving effect to May 14th contract with the Ass...

LECTROLITE CORPORATION, Defiance, O.
Company is ordered by NLRB to cease discouraging membership in UA... or any other labor organization.

GLENN L. MARTIN CO., Baltimore, Md.
UAW-CIO reports that it has been conducting an organization drive ... petition is being filed for an NLRB election.

MONSANTO CHEMICAL CO.
Company has signed a new contract with employes providing wage in... as high as 14½c an hour, say AFL spokesmen.

THE MURRAY CORPORATION OF AMERICA, Detroit, Mich.
NLRB directs representation election to be held for all clerical empl... Ecorse and main plants to vote for or against UAW-CIO.

TENNESSEE AIRCRAFT, INC., Nashville, Tenn.
NLRB directs that an election for representation be held among pro... and maintenance employes to vote for or against IAM-AFL.

TOLEDO SCALE CO., Toledo, O.
Election is directed for two groups of employes to vote for UA... Mechanics Educational Society of America, Scale Workers of Toledo, or...

WESTERN ELECTRIC COMPANY
NWLB has ordered the company to increase pay of 3.500 workers at Ba... and 15.400 employes at Hawthorne Sta., Ill., by 2c an hour.

WESTINGHOUSE ELECTRIC AND MANUFACTURING CO.
NLRB has ordered an election at Canton, O., plant for employes to v... or against UER&M-CIO representation; an election at Lester, Pa., pl... vote for or against UAW-CIO. The Providence, R. I., plant is adv... NLRB that petition filed by International Brotherhood of Electrical W... has been dismissed.

CESSNA AIRCRAFT Co., Wichita, Kan., reports for the fiscal year ended Sept. 30, 1942, net profit of $783,202, equivalent to $2.11 a share. This was after deduction of Federal and excess profits taxes and deduction of $1,254,462 for policy adjustments and conversion from war to peace time operation, and also $4,800,000 provision for refund on Government contracts. This profit compares with $1,796,594, or $5.13 a share in the previous year. Net sales totaled $37,588,529 in 1942, against $13,646,040 in 1941. Currently, $751,511 was provided for Federal income tax, and $4,550,300 for excess profits tax, after deducting a post-war tax ... of $39,385.

Classified Ads

NOTICE — OPERATORS — Have ... desirable locations in a Mid... State for reliable airport op... Must have equipment and exp... Ordinary operating cash requir... record must be good. Write, gi... information in first letter. ... BOX 352, AMERICAN AVI... American Building, Washington...

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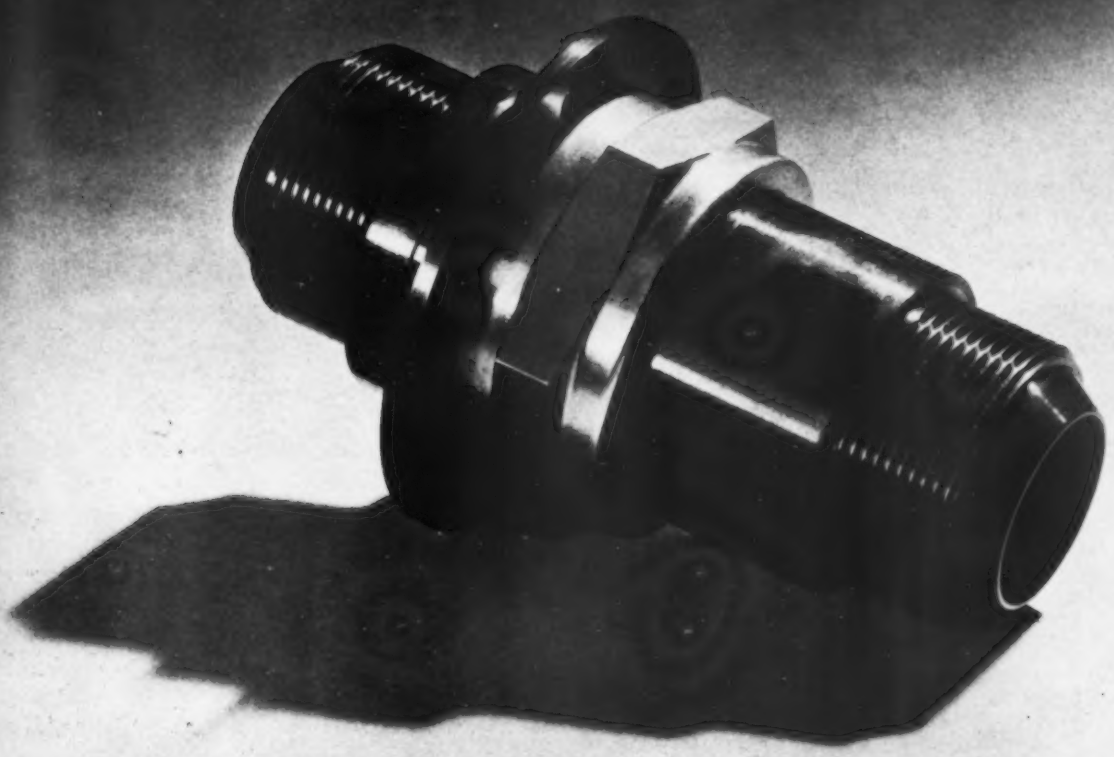

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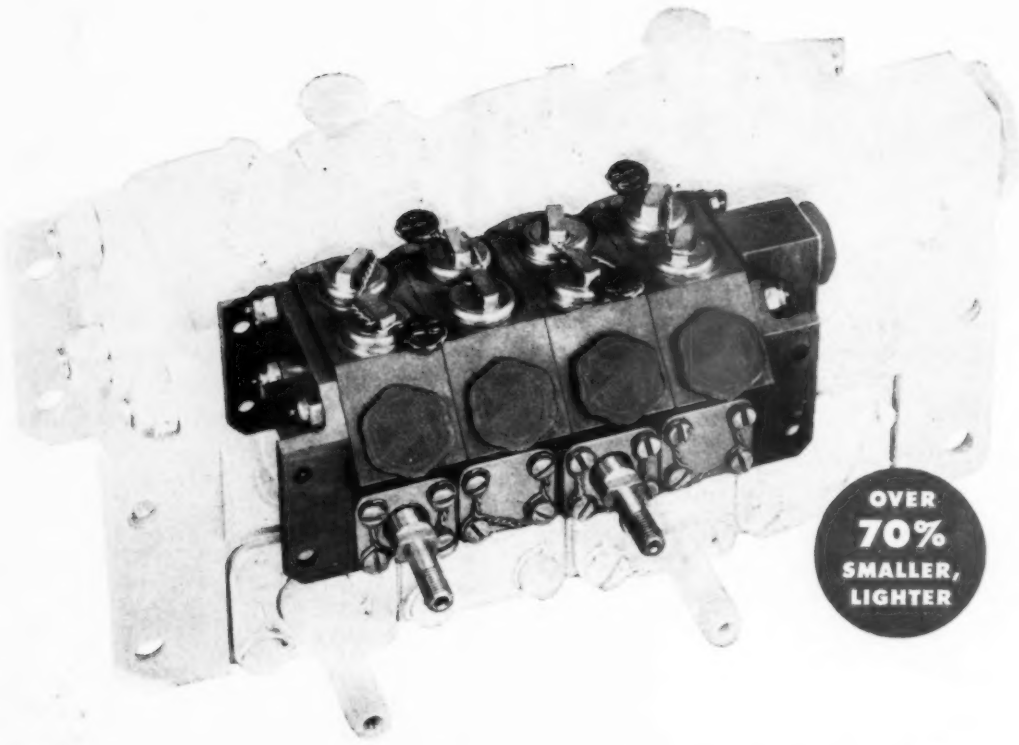

Smaller Space – BIGGER PROBLEM

AIRCRAFT and industrial engineers faced with the problem of installing bulky controls in limited space will welcome the new ADEL Stacking Midget. Utilizing the original ADEL Single Unit Mighty Midget 4-Way Hydraulic Selector Valve which revolutionized previous conceptions by offering space savings of 72% and weight savings of 76%, with performance characteristics actually superior to predecessor models, Stacking Midgets permit the installation of several small size, high capacity valves in a closely confined area. Quadruple Unit illustrated measures only $5\frac{11}{32}$" x $3\frac{3}{16}$" x $2\frac{7}{16}$" with flanges and shafts; weighs only 2.9 lb.

Any number may be clamped together by means of "thru" bolts and end plates which also serve as mounting brackets. All units are interchangeable. Symmetrical design permits turning end-for-end to secure desired shaft arrangement. Individual valve assemblies may be replaced by breaking only the two cylinder lines affected. Over-travel is prevented by an integral stop located on the camshaft. Normal servicing may be done by relatively unskilled persons without special tools.

In compliance with ADEL policy, individual working parts in the entire Midget Group are standardized to permit interchangeability between models and operating parts, economy in part stocks and maximum service facility. Bodies fabricated from dural bar stock to assure uniform strength, freedom from porosity, maximum dependability with minimum size and weight. Valve and camshaft assemblies manufactured from stainless steel, heat-treated to assure long service life. Critical dimensions obtained by grinding, micro-finishing and polishing on specially designed ADEL equipment.

Contact nearest Engineering Service office for complete performance data and installation recommendations. Existing regulations permit submission of complete information only to individuals affiliated with recognized armament industries.

ADEL

PRECISION PRODUCTS CORP.

BURBANK, CALIFORNIA

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